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USE OF CULTURAL LANDSCAPES AS A PART OF OPEN-AIR MUSEUMS

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Abstract. In Ukraine, there is no holistic perception of historical and cultural environments of monumental ensembles and complexes as an object of protection and use today. Their preservation will be effective only when the understanding of the object of protection is extended to the boundaries of the cultural landscape, including all its valuable elements. The best way to implement this concept is to include cultural landscapes in the open-air museum exhibition as its integral, active, and living element.

Key words: cultural landscape, open-air museum, museumfication, exhibition.

Problem statement

The important problem in the field of preservation of architectural and cultural heritage is the direct focus on the object and neglecting its surroundings. The content and essence of the monument are inextricably linked not only with its material structure but also with the environment. Historically formed natural landscape or urban environment reveals its historical and cultural essence, widely discloses the content, enriches the figurative and artistic characteristics.

At the international level, the complex strategy for environmental protection is being developed. One of its directions is the preservation, restoration, and development of the cultural landscape. The modern idea of it is at the formation stage.

Open-air museums include many objects altogether with their surroundings, and all of them are important elements of the historical environment, which does not exist outside of man, but fully reflects the whole sphere of his life and is a natural product of his activities. Despite the presence of numerous cultural landscapes of different types in Ukraine, even as a part of museums or historical and cultural reserves, they are not involved in the exhibition, remaining a neglected background for several major exhibits. Museumfication of monuments in the context of open-air museums creation means the museumfication of the entire complex, including the landscape and environment.

It is in open-air museums that cultural landscapes of various types (territories of estates and residences, parks of palace ensembles, large areas of monastery complexes, industrial landscapes, memorial places, archaeological complexes, etc.) can be protected and displayed.

Analysis of recent research and publications

The concept of “cultural landscape” has appeared in the Ukrainian scientific literature quite recently. Due to the breadth of the concept, most publications are devoted to the definition of the term itself, which can be

traced in the works of G. Denysyk, M. Grodzynsky, L. Bezlatnia, S. Romanchuk, V. Volovyk, I. Kochetkova. Unfortunately, these works have a geographical or cultural orientation.

This topic is more developed in the works of Russian researchers Yu. Viedienin, M. Kuleshova, P. Shulgin, T. Kurianova, V. Kalutskov, and others. However, their works focus on aspects of cultural landscape protection and research on individual sites in the Russian Federation. We can mention the names of such foreign researchers of the cultural landscape as T. Grader, L. Garkovych, Y. Buchas, D. Gardisti, M. Evans, A. Roberts, P. Nelson, and others, but their works are also of cultural nature and describe general approaches to protection, they do not include any applied issues on the topic.

In recent years, this category of heritage has increasingly appeared in UNESCO documents, but the problem of use and incorporation of cultural landscapes into modern life remains unhighlighted in the scientific literature.

Objective of the article

Preservation of cultural landscapes involves their complex protection and use. Based on critical analysis of scientific works and field research on the use of cultural landscapes in Ukraine, the article aims to develop proposals for modern effective forms of use of various types of cultural landscapes by involving them within open-air museums exhibitions.

Results and discussions

The term "cultural landscape" became the object of research in the first half of the XX century, but to this day there are numerous interpretations. According to the most common one, the cultural landscape is both a specific category of cultural and natural heritage (Kurianova, T. S., 2015, s. 285).

The concept of "cultural landscape" is developing in two main directions. One of them is formed in landscape science, where the cultural landscape is considered as a complex in which natural processes operate on a par with anthropogenic ones. The second direction, relevant for this article, is interdisciplinary and emphasizes the cultural component (Shmatkiv, A. S. and Arsenieva, O. I., 2005, s. 7–18).

Within the framework of this article, we take the following definition as the most appropriate: the cultural landscape is a natural and cultural territorial complex formed as a result of evolutionary interaction of nature and man, its socio-cultural and economic activities and consists of characteristic combinations of natural and cultural components that are in steady interconnection and interdependence (Viedienin, Yu. A. and Kuleshova, M. Ye., 2004., s. 16).

The importance of preserving monuments in conjunction with its historic environment is recognized worldwide. The first open-air museums, ethnographic "skansens", were characterized by the use of transferred monuments. Such decisions are allowed in cases where this is the only way to preserve the monument, however, such actions should be avoided. Newly created open-air museums try to use the "in situ" method (original place location). This is the most correct method of preserving buildings, using reconstruction, restoration, and revalorization. Earlier it was mainly used in the creation of eco-museums, but now it is a recognized method of preservation and development particularly valuable historical sites, architectural monuments, and national parks (Sevan, O. G. ed., 1994).

The properties of the cultural landscape can be described by such characteristics as the level of the artistic solution of the estate and park ensemble, the expression and preservation of typical features of the historical landscape, the importance of its associative features, the degree of preservation of individual landscape elements carrying the historical memory of great people and significant historical events. But the most important indicator is the historical value, which is determined by a set of indicators: location, design, setting, materials, workmanship, feeling, associations (Viedienin, Yu. A. and Kuleshova, M. Ye., 2004, s. 25).

The following types of cultural landscapes (according to the UNESCO classification) can become a part of an exposition of open-air museums:

- intentionally created;
- organically evolved, among which there are subtypes of relict and continuing;
- associative (UNESCO, 1999, p. 9–10).

Intentionally created landscapes are mostly objects of landscape architecture (parks and gardens) (Fig. 1). They are characterized by a certain planning composition and in their development are subject to human goals.

Intentionally created landscapes are of the greatest interest in the cultural aspect, as their appearance is maximally subordinated to the idea of their creators.

Natural processes change as a result of long-term and purposeful influence in organically evolved landscapes. This type of landscape includes many areas of agricultural development.

Relict landscapes are mainly "fading" landscapes that are surrounded by an unfamiliar cultural environment or in natural conditions that have changed. These may be the remnants of ancient civilizations that have disappeared or lost the function of the cultural tradition bearer. These include monuments of archaeological or paleontological heritage (Fig. 2).

The continuing landscape is associated with traditional cultures that have retained their active social role in that part of modern society where there is a strong connection to the traditional way of life.

Associative landscapes include natural complexes that are of cultural value, as well as developed landscapes, in which the nature of development is secondary, and the connection with historical events, personalities, works of art is primary (Fig. 3). In associative landscapes, the cultural component is often presented not in material but a mental form. Due to this, they are included in the historical and cultural space without changing their inherent natural rhythm and evolution (Shmatkiv, A. S. and Arsenieva, O. I., s. 20–21).

Fig. 1. Intentionally created landscape. Fragment of Kachanivka palace park. Chernihiv region, Ukraine. Author's photo

Fig. 2. Organically evolved relict landscape. Archaeological site of historical and cultural reserve "Ancient Plisnesk". Lviv region, Ukraine. Author's photo

Fig. 3. Associative landscape. Site of Berestechko Battle near "Cossak's graves" memorial museum. Rivne region, Ukraine. Author's photo

In the demonstration of cultural landscapes, the exhibits are their numerous components – architectural objects, the landscape itself, archaeological sites, and intangible cultural heritage. It is significant to make the right choice – what to protect, what to preserve, what to reproduce, and how to form a unique museum environment based on this, which will fully reveal the historical and cultural information potential of the monument complex. In the approaches to revalorization and organization of the cultural landscape within the museum, there are three main activities: integration (unification of any disintegrated landscape), recomposition (restoration of the known original landscape), and integral reconstruction (reproduction of the partly unknown landscape view) (Onufriienko, G. F., s. 595).

Any open-air museum project begins with the definition of all protection zones and the allowable level of change in each of them. The task of establishing protection zones is not only to preserve the physical condition of monuments but also to protect the landscape component and the traditional nature of the environment. Any building designed on the territory of the museum must take into account the visual relations inside the museum, as well as with the surrounding landscape.

Several features that distinguish the work of restorers of the cultural landscape from the restorers of architectural monuments should be borne in mind. The landscape is a dynamic system that is evolving. It cannot be restored or saved in full up to a specific date. Landscape restoration should be carried out based on the principle of conformity of the historical process of its formation and development as a cultural and natural complex (as opposed to the principle of achieving the state of the heritage object on a given date) (Viedienin, Yu. A., s. 179).

In open-air museums, landscapes of the first type, which are elements of architectural ensembles, are often the object of display. They preserve the most material monuments and usually have high aesthetic qualities. The environment has always strongly influenced the formation of the structure of immovable monuments. Terrain, ponds, and greenery largely determined the composition and visual perception of the ensembles. Unfortunately, over time, individual elements of the landscape may be destroyed or altered, and the synergy of architecture and its surroundings may be disrupted. In such cases, one should try to restore the relief, the main visual connections, and the overall composition in its original form. It is inadmissible to create obstacles for contemplation of natural landscapes and architectural ensembles inscribed in the environment. Complementing the components of the ensemble is allowed unless it violates the integrity of the monument complex and destroys its inherent features – composition, spatial organization, layout, architectural form, etc. If the dissonant factor is a new building that cannot be demolished or is valuable itself, despite the later period of construction, then the architectural monuments should be adapted to the new system of representation.

One should not strive for the complete restoration of historic buildings and park areas where they are at the stage of irreversible change. The best solution will be one that will maximize the information potential of the historical environment. In such cases, it may be more appropriate to preserve and demonstrate the changes that have taken place during the historical development of the monument complex.

It is advisable to reproduce some lost elements of the landscape for a complete disclosure of information resources. To form a visual image of the open-air exhibition a limited number of new complementary elements of the signage are allowed. Their style, size, and shape should harmonize with the natural elements of the landscape and existing monuments.

The following measures are recommended to restore the visual integrity of the cultural landscape:

- creation of a system of open and closed spaces between material monuments and symbolic signs;
- reproduction of historically formed space boundaries;
- preservation of the compositional integrity of ensembles and complexes;
- restoration of the natural landscape – features of relief, water objects, landscaping, etc.;
- limiting opportunities for new construction;
- symbolic marking of memorial places and objects;
- arrangement of observation decks and recreational areas.

The spatial layout of monuments in ensembles and complexes will also affect the layout of the museum. The main layouts of open-air monuments – free landscape layout (combined open, closed and semi-open spaces;

buildings and structures are at a considerable distance from each other) and centralized composition layout (buildings and structures close to each other – they surround and form a free space between each other), as well as their mixed version.

In situations where the monuments are located close to each other, their users' activities were concentrated inside the buildings. Therefore, it will be advisable to use interiors for museum functions. Then the area around the monuments can be used for bigger events. The important component of the outdoor exhibition is the visual links. Monuments clustered in one place often form an ensemble, the aesthetic properties of which are revealed in its holistic perception. To demonstrate these properties to visitors of open-air museums, the creation of observation decks around the ensemble is a mandatory part of museum planning – even if these sites are located outside the immediate territory of the museum.

In the case of the dispersed arrangement of objects, life around them was concentrated outside. In such cases, main museum activities should be carried out in the open air. And the planning of tourist routes must take into account the internal composition of such complexes so that when walking from the points where visitors stop, interesting sights open up.

Given the size of open-air museums, it is worth arranging recreation areas on its territory – with comfortable benches, sometimes with the covering, public welfare, and greenery. In such recreational areas, pavilions can be placed to showcase, for example, small multimedia installations. Recreation areas can be both viewpoints, which offer a beautiful sight. The planning and placement of recreational areas will be different in each museum and will be developed in each case individually.

The popularity of excursions based on tourist walking routes proves that space itself can be a fascinating attraction if it is organized uniquely due to nature or man. Most open-air museum spaces are open. There are three main approaches to their organization, namely: 1) a clear division of separate zones; 2) integration of zones into a single space; 3) combined flexible structures.

Features such as complexity, variety, and continuity of visual and transition links between parts can increase a visitor's interest in space. In open-air museums, spaces are limited by existing monuments, so the choice of approach to the space organization depends on the location of existing facilities and is organized by supplementing them with new elements and the formation of a tourist route.

In the approaches to the architectural and spatial organization of open-air museums today it is important to preserve free space, which focuses on the exhibits and creates space for visitor’s interaction with individual monuments.

Creating open-air museums based on associative landscapes remains challenging – most often, these are memorial sites (such as battlefields). In open-air museums created on their basis, the heritage component is presented in an intangible form, based on the connection of the memorial site with certain events or personalities. Thus, memorial sites are the material basis of the information environment of the museum, where even in the absence of material evidence, with varying degrees of accuracy, local memorial sites can still be identified.

Memorial sites and objects (except architectural ones) cannot be kept unchanged, it is not always possible to continue the activities that resulted in such places (for example, it is impossible to conduct actual military activities on memorial battlefields). The architectural and spatial organization of such open-air museums consists in the restoration, conservation, and reconstruction of historical sites, archaeological excavations, and demonstrations, as well as historical reenactments and educational activities, to expand the visitors’ knowledge.

Along with the preserved authentic elements to fill the environment of the museum, memorial signs are installed. They will be different in each case. These can be symbolic memorials and monuments, architectural objects and ensembles, museum expositions, and information signs. They are designed to record information about events and their participants, although they are not of historical value (sometimes, of artistic value). It is significant while installing them not to violate the overall structure and integrity of the memorial environment. Commemorative signs often become the dominant features of space, so their use should be careful and thoughtful.

To enhance associativity, it will be expedient to carry out historical reenactments in the landscape museums, which consist of the theatrical reflection of a certain historical event. If this action takes place in the

appropriate environment, and not on the stage or the TV screen, such an action leaves a much stronger impression and is much better remembered.

The possibility of reenactment of historical events should be provided by spatial planning. The lack of disharmonious modern objects and the integrity of the visual perception (at least from the main viewpoints) will be of great significance (Brych, 2019, p. 151–152).

Organically evolved landscapes in open-air museums are represented by agricultural lands of estates, residences or monastic complexes, industrial landscapes of some manufacturing monuments, as well as the territory of archeological complexes. Thus, the demonstration of landscapes of this type will be characterized by approaches to display, which are inherent in both previously considered cases.

Agricultural and industrial areas that are part of architectural or manufacturing complexes are more similar to intentionally created landscapes, except that their main characteristic will be not aesthetic but practical. Their existence depends not only on the rhythm of natural processes but also on the systematic additional influence, without which these landscapes can begin to regress. Such landscapes lose their shape after they cease the use for their intended purpose. Preservation of such landscapes is closely connected with the life of the local population and with the possibility of carrying out traditional or similar activities. Therefore, in open-air museums, if possible, it will be appropriate to demonstrate production processes at least in small fragments of these areas.

Archaeological monuments can have the features of both intentionally created landscapes (partially preserved individual monuments) and associative (fossils and ruins). Therefore, the display methods will be different in each situation, but elements of both approaches described will be often used.

Conclusions

The actions taken today concerning monumental ensembles and complexes indicate the lack of a holistic perception of the historical and cultural environment as an object of protection and use. The cultural landscape contains many elements, includes both tangible and intangible aspects of human existence, in the particular, natural, and geographical environment, so the actions planned for it are exploratory. Preservation and use of the cultural landscape is a long-term and gradual process, that requires a great effort.

The tasks are the invention of key elements, the definition of forms and conditions of evolution, development, and implementation of special measures for restoration and maintenance of cultural and landscape complexes, as well as involvement of local population and organizations in the implementation of these measures.

Many characteristics of cultural landscapes can be used in modern tourism, in particular in the form of an open-air museum. Using them as a key or additional element of the exhibition will expand the potential of monumental complexes not only through acquaintance with the monuments on the territory but also with various forms of traditional production (arts and crafts, manufacturing, ancient technologies, etc.). The best use is the organization of various events – festivals, holidays, concerts, historical reenactments dedicated to historical events or personalities. For some landscapes that have special aesthetic properties, it is advisable to assign a recreational role.

Preservation of the entire historical and cultural complex will be done properly only when the understanding of the object of protection will be extended to the boundaries of the cultural landscape, including all its valuable elements. The best way to implement this concept is to include cultural landscapes in the exposition of open-air museums as its integral, active, and living element.

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ВИКОРИСТАННЯ КУЛЬТУРНИХ ЛАНДШАФТІВ ЯК ЧАСТИНИ МУЗЕЇВ ПІД ВІДКРИТИМ НЕБОМ

Анотація. *Дії, що сьогодні вживаються стосовно пам'яткових ансамблів і комплексів, свідчать про відсутність цілісного сприйняття історико-культурного середовища в якості об'єкта охорони та використання. Важливою проблемою у сфері збереження архітектурної культурної спадщини постає фокусування безпосередньо на об'єкті і нівелювання його оточуючого середовища. Зміст і суть пам'ятки невіддільно пов'язані не лише з її матеріальною структурою, але й з оточенням. Історично сформоване природно-ландшафтне чи міське середовище виявляє її історико-культурну сутність, широко розкриває зміст, збагачує образно-художні якості.*

Багато характеристик культурних ландшафтів можуть бути використані в сучасному туризмі, зокрема у формі музею під відкритим небом. Використання їх в якості ключового чи вторинного елементу експозиції розширить потенціал пам'яткових комплексів. Музеї під відкритим небом включають численні об'єкти разом з оточенням, і всі вони є важливими елементами історичного середовища. Музеєфікація пам'яток в контексті створення музеїв під відкритим небом означає музеєфікацію всього комплексу, включно з ландшафтом та середовищем.

Саме у музеях під відкритим небом культурні ландшафти різного типу – угіддя садиб і резиденцій, парки палацових ансамблів, широкі території монастирських комплексів, промислові ландшафти, меморіальні пам'ятні місця, археологічні комплекси тощо – можуть стати об'єктом охорони і показу.

Збереження всього історико-культурного комплексу буде ефективним тільки тоді, коли розуміння об'єкта охорони буде розширено до меж культурного ландшафту, включаючи всі його цінні елементи. Оптимальним шляхом реалізації цієї концепції є включення культурних ландшафтів в експозицію музеїв під відкритим небом як невід'ємного, активного і живого елемента експозиції.

Ключові слова: *культурний ландшафт, музей під відкритим небом, музеєфікація, експозиція.*

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ISSUES OF DESIGN OF INFORMAL LEARNING SPACES IN THE UNIVERSITY CULTURAL CENTERS

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Abstract. The article presents an overview and analysis of the state of research in the field of design and exploitation of modern educational spaces in universities around the world, namely areas with flexible planning, called informal learning space. According to the research conducted, the general characteristic and classification were developed and the basic principles of designing this space were revealed. The study identified several problems that arise during its exploitation, which should be taken into account in the designing process. There is described the experience of educational design of interuniversity cultural centres with the application of the developed theoretical bases of designing of informal educational space.

Key words: informal learning space, educational environment, campus, university cultural centre

Problem statement

The active social life of students has been an inseparable component of university starting from the medieval age. However, many modern campuses lack public cultural spaces. Students spend most of their time outside the lecture hall or the classroom, which can be classified as official or formal spaces for education. They communicate with each other, study individually, have some rest, but this happens, unfortunately, outside the university. The reason lies in the absence of the so-called informal space in most of the campuses. Such space triggers social interaction, e.g. unexpected meetings or extemporaneous talks. It promotes personal and professional growth. According to M. Brown (Brown, M. 2006), food establishments, corridors, halls, squares, yards, and dormitories are significant elements for designing informal zones for individual and group study. Even though the nature of the enlisted groups is either chaotic and unadjusted or just not designed for performing such functions.

Analysis of recent research and publications

For hundreds of years, the construction of the campus followed a stable formula: universities had to provide places for teaching, lunch, sleep and entertainment. However, today this formula is much more complicated. This context has a significant impact on the physical design of campuses. We see new types of buildings and new approaches to planning. The book University Trends (Taylor, I., Coulson, J., Roberts, P., 2014) highlights this changing climate and how various institutions have responded physically to the financial, pedagogical, and technological conditions of modern higher education and we can see it on real projects from around the world. An analysis of the types of modern construction and planning projects was also conducted,

based on which a list of the main trends that form the planning and architecture of universities today was established: adaptive reuse; flexible architecture; hub houses; interdisciplinary research facilities; transnational education; commercial urbanization; large-scale campus expansions; revitalization (revival) of master plans; online learning.

The book Educational Environment (Yee, R., 2005), based on the analysis of real examples, highlights the peculiarities of the creation and reorganization of educational spaces in US and Canadian universities and summarizes that modern campuses look much friendlier to students than ever before. Shirley Dugdale in publication Spatial Strategies for the New Learning Landscape (Dugdale, S., 2009), considers campus not as a space between academic buildings, but as one of the effective learning tools and learning space objects.

Diana Oblinger (Oblinger, D., 2006) in the book Learning Spaces, treats these spaces not just as places for several approved activities, they provide an environment for people. Factors such as the availability of food and drink, comfortable chairs and furniture that are adapted to a variety of learning activities are becoming important criteria in the design of learning spaces that take human factors into account as integral to the design of learning spaces. The rapidly growing availability of digital technologies is also changing the design of the space. Digital technologies continue to evolve at an increasing rate, offering students greater access to information while becoming more mobile.

The issue of adapting existing learning spaces to the needs of modern students is actively studied. In particular, in the study Colleges and Universities – Educational Spaces (Kramer, S., 2010), the author elucidates the need for access to an ever-increasing knowledge of mankind and the provision of communications, which are becoming important aspects of campus design, along with the multimedia requirements of modern universities for the organization of an educational process.

The publication devoted to the exploration of university architecture, Campus Planning (Dober, R.,1992), illustrates ideas on how campus design can advance and support important institutional goals. Illustrated examples from around the world show how higher education institutions have a strong sense of place, a unique image and the ability to rebuild a campus, and how professional design can help achieve these goals. A wide range of case studies covering all types of campuses illustrates how to create a campus that is functional, attractive and accessible.

Objective of the article

The purpose of the article is to highlight positive experiences of integration of new type – informal educational spaces into the functional content of university or interuniversity cultural centres, which will significantly improve the attendance of such establishments and fill in the gaps in the organization of educational processes on the university territories.

Results and discussions

The question of public space in the form of informal educational zones is topical nowadays because of the following reasons:

– Understanding that the majority of educational events take place outside the formal space;

– Absence of the open zones for individual learning during free time or between lectures in campuses of many modern Ukrainian universities;

– Construction of the informal educational environment is innovative and can bring many advantages, for instance, such spaces usually are adjoined with canteens and outlets that have the positive impact on their profitability and can become a source of income for the university;

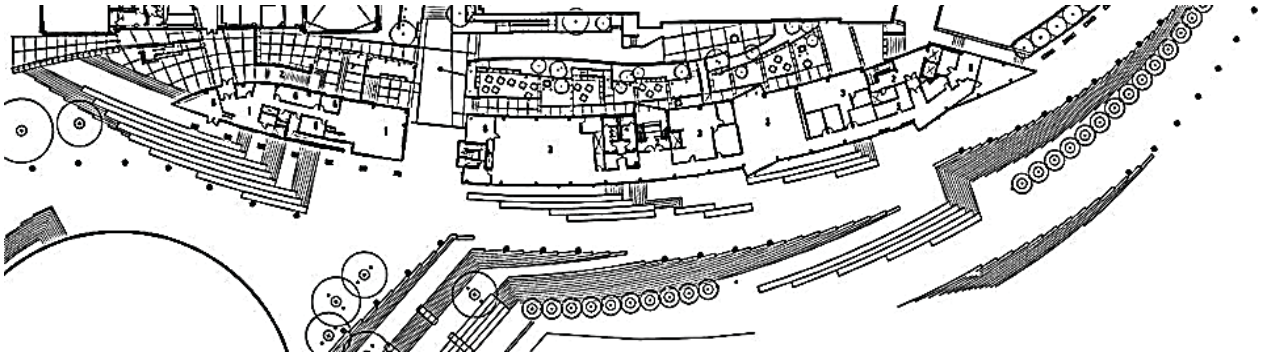
– Modern teaching and learning methods rely on informal learning space. Educational space should ensure the possibility for students to get to know each other and enter into dialogue while working on a group project and cooperating in different directions.

Taking into account the importance of this issue, universities should re-organize or construct new learning spaces to meet the expectations of future students. For example, Student Culture Zone, located in Wrocław University of Technology, Poland (Fig. 2), illustrates how the created informal learning space contributes to the effectiveness of exploiting the existing environment, makes it more attractive and comfortable.

The Joseph A. Steger Student Life Center at the University of Cincinnati (Fig. 3) serves as another example of how informal educational zones increase the amount of time spent by students while studying. The mentioned object shows that its space is not limited by the walls but interacts harmoniously with the surrounding environment and performs the range of practical tasks, particularly, integration of separate buildings into a united system and creation of the environment suitable for the long-term stay of its visitors.

Fig. 2. Interiors of Student Culture Zone, located in Wrocław University of Technology, Poland

a



b

Fig. 3. The public space around Joseph A. Steger Student Center at the University of Cincinnati (USA), the main highway turns into a lively campus space (a); master plan (b)

The provided data display the integration of space into university cultural objects, which is based on a thorough understanding of how students work and live.

Informal learning spaces on the territory of campus can be divided into two main subtypes:

Outdoors

- Garden squares
- Courtyards

Indoors

- Entrance halls
- Corridors

- Pedestrian routes
- Amphitheatres
- Gardens on roofs
- Indoor atriums
- Halls
- Public canteens
- Adjusted rooms

According to the activity organization criterion, such space can be divided into the following zones:

- Zone for silent individual study
- Zone for group study
- Zone for conducting presentations and meetings

These principles should be followed while designing informal learning spaces:

The right space design should be visually interesting, but, at the same time, should not distract the ability to concentrate.

Motivation: well-planned places for studying have a motivational effect on students. Informal educational zones create the environment, which is simple and pleasant for working outside the classroom. Involving students in terms of design is significant since it means that students can choose their comfortable studying conditions.

Individualization and interaction: students as a social group are peers and this factor decreases communicative barriers between them. Therefore, learning zones with open planning ensure both individual and collective environments. Changes in the interior and landscape design can help students' navigation in space and improve their behaviour depending on the space function. Such an approach is supported by all types of students since it encourages them to different ways of studying.

Flexibility and transformation in project decisions of informal learning zones have become the requirements, conditioned by the rapid technological changes and the increase of students' quantity. The possibility to change space parameters quickly and without any obstacles gives a chance to extend the target range of exploitation.

Ergonomics is something more than just a comfortable chair. Ergonomic thinking considers the whole environment and its interaction with the human body. Well-planned pedestrian connections, open access to equipment and consumable materials, and easily movable furniture are the preconditions of ergonomic space. The variety of human parameters presupposes that furniture should be regulatory. We have to remember two main principles of ergonomics, which are the following: should not bring pain and should not traumatize.

Modern educational spaces should be oriented to students and equipped with all technologies necessary for satisfying their subjective needs. Particular attention should be paid to the fact that each modern student has his technical devices used for studying. Thus, the demands connected with access to Internet resources and the electrical grid should be considered. It should also be noted that the correct spatial design of educational spaces with flexible planning should be visually interesting, and at the same time should not distract from the ability to concentrate.

Taking into account the fact that special zones for conducting large-scale cultural and educational events, having rest or individual studying during the free time were not envisaged while designing campuses of national universities, the Department of architectural environment design at the Lviv Polytechnic National University launches the educational subject of projecting university and interuniversity cultural centres. As the analyzed foreign experience shows, informal learning zones are their inherent component.

Among students' works, we would like to single out the educational project of the student Iryna Seniv, supervisors Sc.D., Prof. Viktor Proskuryakov and PhD-student assistant Olga Dmytrash. The area, chosen for the student centre, is located within the campus of Lviv Polytechnic at 8 Ustyyanovych Str. The three-floored building with a walkable roof and a cellar satisfies the needs of a modern university community. There are two small cinema halls, a cafeteria, a book shop, a copy-centre, conference rooms, an exhibition area, an open amphitheatre in the hall, which links the ground and first floors and can serve as a place for conducting different cultural and educational events, or a room for individual studying during free time (Fig. 4).

Fig. 4. Educational project of the student Iryna Seniv,
Lviv Polytechnic Student center at 8 Ustyyanovych Str., in Lviv

There also should be mentioned the educational project of the student Lina Yakym, supervisors Sc.D., Prof. Viktor Proskuryakov and PhD-student assistant Olga Dmytrash. The complex of the interuniversity cultural centre is planned in the square garden at Pekarska Str., next to the campuses of the Lviv National Medical University and the Lviv National University of Veterinary Medicine and Biotechnology (Fig. 5). The complex consists of an interuniversity centre building, the front face of which will serve as a big media screen, and an open landscape amphitheatre.

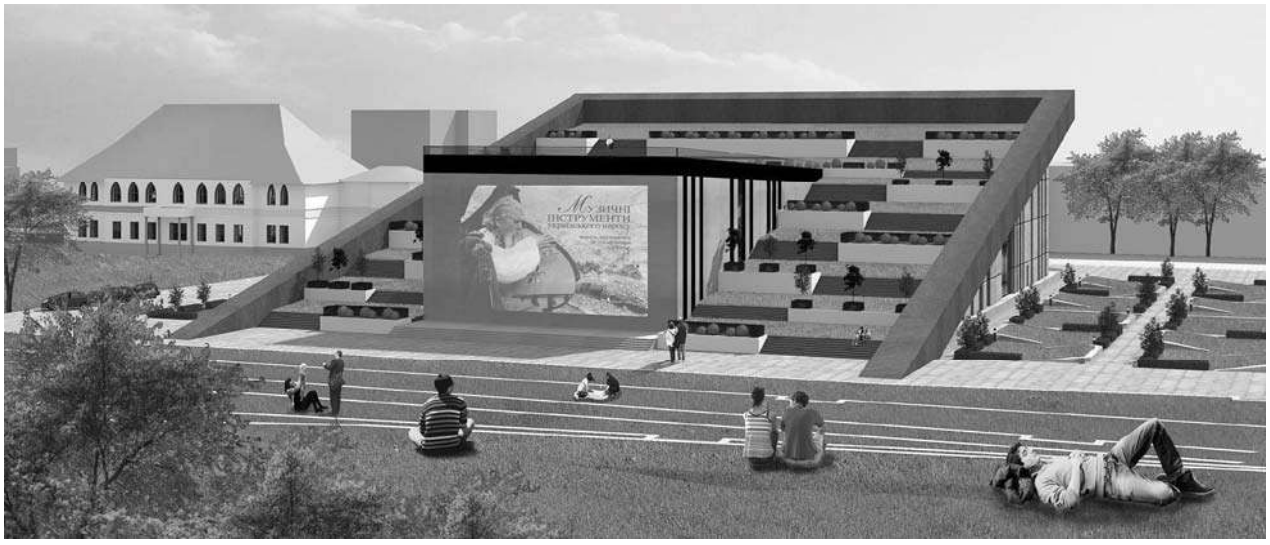


Fig. 5. Educational project of the student Lina Yakym, Interuniversity cultural center at Pekarska Str., Lviv

Conclusions

Informal learning space can positively change the educational process perception. Each decision made by an architect influences the behaviour of people studying and teaching in this environment. The educational process will be more effective if the environment works as its integral powerful tool. However, the number of problems can be faced:

1. Public space is rarely envisaged by the project of university major construction works.
2. If such zones still are envisaged by the project, they get re-organized into formal learning rooms in the process of exploitation. This happens because of the increasing number of students that results in the lack of lecture halls.
3. Usually, informal learning space does not belong to a certain department or an organization, which is the precondition for the lack of technical equipment.

4. Zones of this type are mainly organized in the already existing environment. Because of the adjusted character, they often fail to perform their function.

5. There are only a few implemented examples for determining the universal model or design norms, which would be based on practical experience.

Students and lecturers, like other people, are willing to live or work in a pleasant, stimulating, attractive, and safe environment. However, such aspirations are often ignored in the process of university designing. Large sums of money are used to construct objects that hide their active assets behind the blind walls. It would be reasonable to direct some investments into creating an open public space since researches and opinion surveys proved that universities with an open system of public cultural and educational objects enjoy more popularity among school graduates, investors, and partners.

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ПРОБЛЕМАТИКА ПРОЕКТУВАННЯ НЕФОРМАЛЬНИХ НАВЧАЛЬНИХ ПРОСТОРІВ В УНІВЕРСИТЕТСЬКИХ КУЛЬТУРНИХ ЦЕНТРАХ

Анотація: *З часів Середньовіччя складовою ідеї університету було активне суспільне життя студентів. Однак багато сучасних кампусів позбавлені загальнодоступних громадських культурних просторів. Студенти проводять більшу частину свого часу за межами лекційної зали чи навчальної аудиторії (групи приміщень, які ми можемо віднести до офіційного або формального простору для навчання). В цей час вони спілкуються, самостійно навчаються, відпочивають. А відбувається це, на жаль, за межами університету. Причиною цього є відсутність у більшості студмістечок так званого неформального простору. Це простір, який провокує соціальну взаємодію: несподівані зустрічі, імпровізовані розмови. Він сприяє особистісному і професійному зростанню. Заклади харчування, коридори, холи, площі, двори, гуртожитки стають важливими елементами для формування неофіційних зон для самостійного і групового навчання. Проте, характер перерахованих існуючих груп приміщень здебільшого є хаотичним та непристосованим, або просто не передбаченим для такої функції. Тому інтеграція неофіційних навчальних просторів у склад функціонального наповнення університетського чи міжвузівського центру культури значно покращить відвідуваність таких закладів і заповнить прогалини в організації навчального процесу на території університету.*

У статті представлено огляд та аналіз стану досліджень у галузі проектування та експлуатації сучасних освітніх просторів в університетах світу, а саме просторів з гнучким плануванням, які називаються неформальним навчальним простором. Внаслідок проведених досліджень була розроблена загальна характеристика, класифікація, розкрито основні принципи проектування цього простору. Зокрема, визначено низку проблем, що виникають під час його експлуатації, які слід враховувати при проектуванні. Висвітлено досвід навчального проектування міжвузівських культурних центрів із застосуванням розроблених теоретичних основ проектування неформального освітнього простору.

Ключові слова: *неформальний навчальний простір, освітнє середовище, кампус, університетський культурний центр.*

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EXPERIENCE IN USING MODULAR SOCIAL HOUSING

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Abstract. The modular modular architecture is currently actively used in construction since it has many advantages over traditional construction. This type of design simplifies and speeds up the process of creating not only social housing, but also campuses and hospitals when there is an epidemic and you need to quickly provide patients with wards, or get out of the housing crisis during the economic crisis. In addition to being practical, it is much cheaper and more environmentally friendly. This article provides examples of the use of modules in construction and architecture to argue the relevance and need to use modular architecture and develop it.

The use of the technology of modular formation of architectural objects can solve urgent problems in the modern world: overcoming the consequences of natural disasters, hostilities, the formation of social and niche specialized housing. These examples are not innovations that are unattainable or not scalable for technological reasons. The highlighted issue only shows the need to disseminate these solutions in practice.

Key words: modular construction, social housing, real estate market, housing for migrants, housing crisis, economic crisis.

Problem statement

Nowadays, there are many problems in the world with housing, or rather with the proper use of land to provide all people with housing given their economic opportunities. Most countries are now struggling with several issues such as:

– a large number of homeless people who can not afford full housing at market prices;

– housing crisis, as most European countries do not have time to build housing for the local population and the rate of influx of migrants;

– the cost of construction is unstable and is often an expensive pleasure because the market is constantly affected by economic crises;

– duration of construction.

The purpose of social housing is accessible housing to all segments of the population, i.e. it is cheap. To make it cheap, a modular method of assembling apartments or houses is often used. Nowadays, many construction and architectural companies offer their services to create a modular architecture. For example:

– CONCR3DE has created a new method of 3D printing, which allows you to print 3D parts with high expansion and high strength using concrete and most importantly at a low price.

– ECOGLOBE helps architects, engineers and real estate developers to make their projects more sustainable in the economic sphere.

– Woodyshousing offers high-quality modular housing for temporary or permanent premises.

– In May 2018, Icon for the first time offered and presented a 3D-printed house as a solution with a shortage of housing.

Objective of the article

The objective of the article is to draw attention to the use of modular architecture in construction and describe the experience of using modules for the construction of social housing.

Results and discussions

Modular architecture has a number of advantages and it is:

– Assembly of modules takes place in the premises, which helps to eliminate the payment for the downtime of workers and equipment on construction sites due to bad weather.

– Assembly of modules can be carried out during the year, regardless of what time of year it is. Thus, the modules can be prepared in winter and mounted on-site in the spring.

– The use of unified elements when mounting the module reduces the risk of errors, so the costs are more predictable.

– Due to the small mounting area of the module there is no large amount of heavy equipment. You do not need to prepare a large area to use the module.

One of the Chinese architectural firms Modular Social Housing (HKCSS is now developing three modular social housing projects [Electronic resource] // Modular Social Housing. – 2020. – Resource access mode: https://modularsocialhousing.org.hk/en/existing-project) is just purposefully developing modular arrays in Hong Kong for ordinary families and people living in inadequate living conditions. Modular Social Housing considers the problem of apartments with high rental costs and besides, most often they are socially isolated, so the company offers its services.

HKCSS promotes and develops social housing, not only addressing the housing problem but also seeking to help these low-income households build a community support network. With the help of the network, they could find more resources and support the community to improve their quality of life and gradually get out of poverty.

Modular Social Housing uses integrated modular construction because it is the most efficient, economical and environmentally friendly way to build transitional/temporary social housing.

The view of modular housing Modular Social Housing can be seen in Fig. 1.

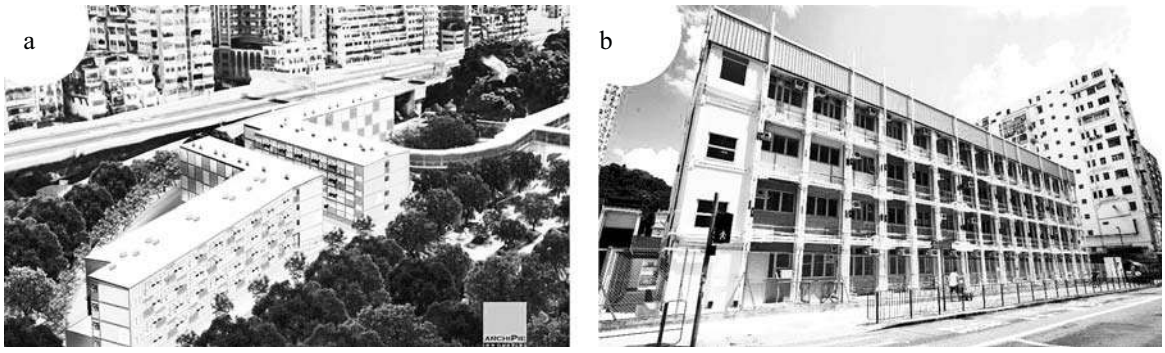

Fig. 1. Modular Social Housing Project on Yen Chou Street, Hong Kong (a);
Modular Social Housing Project on Nam Cheong Street, Hong Kong (b) (Nam Cheong Street Modular Social Housing Project [Electronic resource] // Modular Social Housing. – 2020. – Resource access mode: https://modularsocialhousing.org.hk/en/content/nam-cheong-street-modular-social-housing-project)

Another reason for using a modular architecture is speeding up the construction process. Sometimes in an urban environment, you have to go outside the site to carry out construction, but there is one nuance and that is that the time of construction, in this case, is reduced twice than if the construction took place only on your site. Off-site construction offers an accelerated schedule and a shorter funding period. An example of solving this problem with the help of modules is The Stack Modular Housing in Manhattan / Gluck + (The Stack Modular Housing in Manhattan / Gluck + [Electronic resource] // ArchDaily. – 2020. – Resource access mode:

https://www.archdaily.com/943491/the-stack-modular-housing-in-manhattan-gluck-plus?ad_source=search&ad_medium=search_result_all). This project is located on a small and complex site, which complicates the construction process.

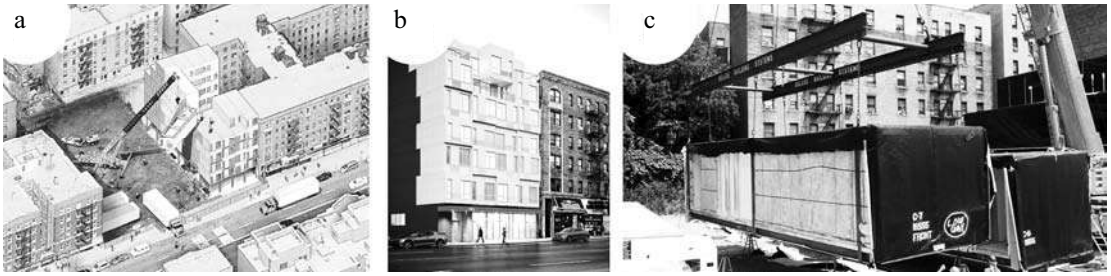

Fig. 2. Method of mounting modules from the adjacent area using a crane (a); appearance of the external facade and volume (b); unloading of the assembled modules at the construction site in New York, USA (C) (The Stack Modular Housing in Manhattan / Gluck + [Electronic resource] // ArchDaily. – 2020. – Resource access mode: https://www.archdaily.com/943491/the-stack-modular-housing-in-manhattan-gluck-plus?ad_source=search&ad_medium=search_result_all)

This project by the architectural firm Gluck + has developed a quality and cost-effective housing solution for strategic restructuring and filling gaps in the city's outdated housing infrastructure. Besides, a very specific method of mounting modules in the structure of the building was used.

Although this is not mandatory for this construction methodology, the design of this 7-storey residential building expresses its modular design. Each unit is readable but is also read as part of a whole. A common misconception about "modular" design is that units are products; in each – a whole apartment with a certain design. Off-site construction is just an alternative method of construction. The building is designed according to his needs, and then "cut" into parts that can be completely manufactured at the factory, and then transported and installed in the intended place.

Another example of the practicality of temporary modular social housing is the situation in Rotterdam in 2018. The municipality and social housing associations of the Netherlands have started to order mass production of modular social housing at factories for the production of mobile mini-houses. Rotterdam has begun to create settlements for low-income citizens and announced plans to sell about 3.000 units of social housing (What do thousands of new social mini-houses in Rotterdam look like [Electronic resource] // Construction portal of new technologies. – 2016. – Resource access mode: https://taratutenko.ru/kak-vglyadyat-tsyatchi-novh-sotsialynh-mini-domov-v-rotterdame.html). According to experts, the Netherlands will need about a million new homes by 2030, and of course, the traditional construction industry will not be able to do so much work. To alleviate the situation, the authorities have changed the requirements for new housing, because it is now possible to have a residential function in basements and attics. But the real successful breakthrough can be the mass production of inexpensive mobile modular homes. The country's Cabinet of Ministers is set to produce at least 75,000 mini-houses a year.

Mini-houses from the Heijmans company. As befits the implementation of a large-scale state program – first of all, standard samples of mobile mini-houses were selected and approved. The most popular option is offered by Heijmans because they took these houses and began to form new settlements in Rotterdam.

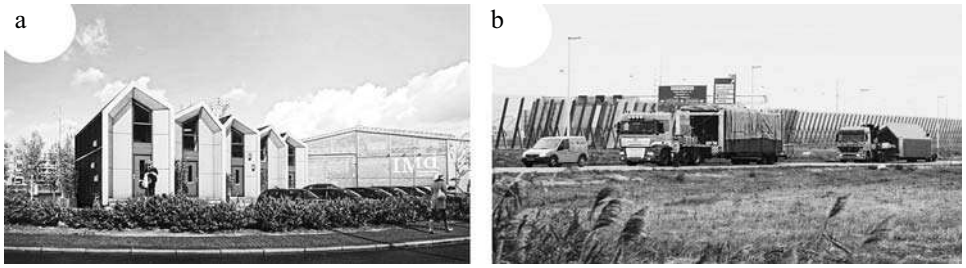

Fig. 3. View of mini-houses from the company Heijmans (a); transportation of a modular house (b) (What do thousands of new social mini-houses in Rotterdam look like [Electronic resource] // Construction portal of new technologies. – 2016. – Resource access mode: https://taratutenko.ru/kak-vglyadyat-tsyatchi-novh-sotsialynh-mini-domov-v-rotterdame.html)

Conclusion

Nowadays, most European countries suffer from economic and social crises, which means that many people do not have the finances to rent or buy an apartment. It looks like a vicious circle that helps to open a

modular architecture due to its accessibility. Besides, many organizations that rent or sell social housing employ people who have settled in this type of housing. The experience of using modules is optimistic because with their help you can create an interesting volume or speed up construction, and also provide people with not only temporary housing but also permanent. It is necessary to develop this type of architecture and further seek the principles of forming a modular architecture, which will be not only affordable but also multifunctional and with the most efficient use of land, the amount of which is decreasing every year. If this industry is developed, it is possible not only to solve the problem of the housing crisis but also to make part of the housing market stable.

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ДОСВІД ВИКОРИСТАННЯ МОДУЛЬНОГО СОЦІАЛЬНОГО ЖИТЛА

Модульна архітектура на сьогодні активно використовується в будівництві, бо має чимало переваг в порівнянні з традиційним будівництвом. Такий тип проектування спрощує і пришвидшує процес створення не тільки соціального житла, але й студентських містечок, лікарень, коли відбувається епідемія і потрібно в швидкі терміни забезпечити хворих палатами, чи вийти з житлового дефіциту під час економічної кризи. Окрім того, що такий метод є практичним він набагато дешевший та екологічніший. В цій статті наведені приклади використання модулів у будівництві та архітектурі, щоб аргументувати актуальність й потребу використовувати модульну архітектуру та її розвивати.

Використання технології модульного формування архітектурних об'єктів може вирішити термінові завдання в сучасному світі: подолання наслідків природних явищ, бойових дій, формування соціального та нішевого спеціалізованого житла. Наведені приклади не є нововведеннями, недосяжними чи не масштабованими через технологічні причини. Висвітлене питання лише показує необхідність поширення цих рішень у практиці.

Ще одна причина використання модульної архітектури, передбачає змогу пришвидшити процес будівництва. Іноді у міському середовищі доводиться виходити за межі ділянки, щоб реалізувати будівництво, але є один нюанс, і він передбачає, що терміни реалізації будівництва в такому випадку скорочуються вдвічі, аніж, якби будівництво відбувалось лише на своїй ділянці. Таким чином, монтування модульної архутектури не тільки надає змогу пришвидшити будівництво, але й зекономити фінанси в схожих ситуаціях, коли на ділянці немає можливості розмістити великогабаритну будівельну техніку.

Окрім цього, чимало архітектурних бюро розпочинає пропонувати не просто статичну модульну архітектуру, а зокрема ту, яка має змогу адаптуватися до різних кліматичних та топографічних умов. Це також надає шанс розробляти модулі для постійної експлуатації, а не лише для тимчасової. Такий метод трансформації непостійного житла під постійне враховує те, що модуль може доповнюватись іншою архітектурою під потреби замовника, що є дуже зручно. Тому, соціальне тимчасове житло з часом може стати постійним житлом для людей з різними вимогами та потребами.

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TYPES OF HOUSING AND INDUSTRIAL INSTITUTIONS FOR THE HOMELESS IN FOREIGN PRACTICE

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Abstract. Examples of designing institutions for the homeless in foreign practice are considered, which are compared with the results of our sociological study of homeless people in Ukraine. A socio-typological scheme for introducing various types of housing for the homeless is proposed based on the integration of housing units with industrial and educational functions.

Key words: homelessness, housing, poverty, unemployment, shelter, tent, social services.

Problem statement

National National reports estimate that at least 150 million people, or about 2 percent of the world's population, are homeless. Another approximately 1.6 billion, or more than 20 percent of the world's population, live in very cramped conditions of overpopulation, their housing parameters do not correspond to any generally accepted ideas about basic sanitary and hygienic living conditions.

World statistics show that homeless people are everywhere: both in poor countries and in the richest. However, the leaders in the number of homeless people consistently remain: Nigeria – 24.400.000 homeless people (2007); Egypt – 12.000,000 (2013); Indonesia – 3.000.000 (2004); China – 2.579.000 (2011); Haiti – 2.300.000. (2010); India – 1.770.000. (2011); Zimbabwe – 1.200.00 (2013); Honduras – 1.000.000 (2013); Germany – 650.000 homeless people as of 2018; USA – 552.830 homeless (2018); England – about 307.000 homeless in 2011; Canada – at least 235.000 homeless in 2018; France – approximately 93.000 according to a 2012 survey; Czech Republic – 68.500 homeless people (2015); Italy – 48.000 (2014.) (List of countries by homeless population [Electronic resource] – 2020 – Resource access mode: <https://en.wikipedia.org/wiki/List_of_countries_by_homeless_population). In Ukraine, in 2019, 33 thousand homeless people officially applied for help, but experts on this issue believe that unofficially there may be about 200 thousand of them.

Each country throughout its history has had its own experience in combating homelessness, its own mistakes and, conversely, successful steps. Every year, Canada spends 4.5 to 6 billion on homelessness issues. The law on housing and communal services has been amended, and 20,000 units of social housing are being

built annually. France spends about 2 billion a year on homelessness problems. Austria spends almost 1.5 billion euros a year. It is estimated that the United States spends $40,000 a year per homeless person.

In Ukraine, as far as possible, some attention is also paid to the homeless. However, due to economic reasons, this problem is still very far from being solved. There is a strong shortage of places in social protection institutions for homeless citizens. Besides, most institutions for the homeless are in poor condition and do not meet the current DBN standards. They are not adapted for a year-round comfortable stay, so many destitute people move to the streets with the onset of heat. So, the main goal of this study is to find possible solutions to the problem of homelessness in Ukraine, by analyzing modern foreign institutions for the homeless, but with a special focus not on temporary housing as a kind of social, but institutions where homeless people can not only live but also work, study, etc., that is, economically fully support themselves and even accumulate resources for independent living.

Analysis of research and publications

An analysis of the scientific literature shows that the problem of homelessness is still insufficiently studied. On the pages of printed publications, there are articles of practitioners begging for help. Scientific and methodological journals practically do not pay attention to this problem. Its lack of development increases the relevance of the detailed study, since, having arisen in the post-Soviet period, the problem of small vagabonds and street children has become new and unlike the problem of homelessness at the beginning of the XX century.

The problem of homelessness and vagrancy was explored from a psychological point of view by Kabachenko N. V. (Kabachenko N. V., 2008, Kabachenko N. V. 2020) V. V. Kutsevich participated in the creation of norms for social protection institutions (Kutsevych V. V., 2007). Existing services for homeless adults and approaches to their development have been the focus of attention of foreign researchers such as M. Burt (Burt M., 2001), S Davis (Davis S., 2004) and others. Child homelessness is covered in the works of A. O. Akhaimova (Akhayimova A. O., 2005). In Ukraine, this topic is also reflected in the publications and dissertation work of Soloviy L. S. (Hnes' I. P., Soloviy L. S., 2010). However, the problem of housing for the homeless remains relevant, and in different countries, it continues to be solved in one way or another. Tracking new empirical experience from foreign practice can be a significant benefit for domestic specialists in solving these issues in Ukraine.

Objective of the article

The purpose of this work is to highlight the experience of forming innovative types of housing for homeless people in foreign design and construction practice.

Research and discussion

In Ukraine, there are the following types of housing for the homeless: **night stay house** – a social protection institution for overnight stays of citizens who do not have residential premises that they could use for a living (standard provision on night stay /approved by the Order of the Ministry of Labor and Social Policy of Ukraine No. 31 dated 14.02.06). **The Center for the reintegration of homeless citizens** (hereinafter the Reintegration Center) is a social protection institution for homeless citizens, whose activities are aimed at gradually returning a person to independent full-fledged life by providing him with a set of social services tailored to individual needs (regulation on the Center for the Reintegration of Homeless Citizens / approved by the Order of the Ministry of Labor and Social Policy of Ukraine No. 31 dated 14.02.06). **The Center for Social Adaptation of Persons Released from Places of Deprivation of Liberty** (hereinafter the Center for Social Adaptation) is a social institution for providing social services to persons released from places of deprivation of liberty and their temporary stay (regulation on the Center for Social Adaptation for Persons Released from Places of Deprivation of Liberty / approved by the Order of the Ministry of Labor and Social Policy of Ukraine No. 31 dated 14.02.06). **Social Hotel** – a social protection institution for the stay of homeless citizens, which includes separate rooms (regulation on a Social Hotel / approved by the Order of the Ministry of Labor and Social Policy of Ukraine No. 98 dated 03.04.06) (Zakon Ukrayiny pro osnovy sotsial'noho zakhystu bezdomnykh hromadyan i bezprytul'nykh ditey – 2020 – Resource access mode: <http://www.rada.kiev.ua)

Both foreign and domestic experience in the operation of conventional flophouses shows that they only delay and aggravate some problems that arise among homeless people. Employees of social assistance services

working with similar patients confirmed their guesses that homeless people lack a sense of security and confidence in the future in temporary housing. Besides, this type of housing for the homeless is also perhaps the most expensive for the state or city, since homeless people become full dependents in housing built at the expense of society. Therefore, the main efforts in the fight against homelessness are proposed to focus on social rehabilitation of the homeless, their return to society, to a full-fledged independent life – ***it is much cheaper to provide the homeless with permanent (rental) housing than to maintain temporary shelters or help those who spend the night on the streets.***

In foreign practice, the following types of institutions for the homeless are mainly distinguished:

Flophouse shelters are institutions that provide temporary, short-term accommodation for homeless people and families. They may include other services, such as food, clothing, etc.

Transitional housing. Temporary shelter services, but they can be distinguished from emergency shelters by their longer stay and greater intensity of services and support offered to the homeless. Transitional housing is an intermediate step between emergency shelter and permanent housing. Support services help clients gain stability and self-sufficiency to maintain permanent housing. The stay usually lasts from three months to three years.

Shelters for women and children affected by domestic violence provide temporary shelter to single women or women with children and can function either in crises or as a transitional or second form of housing.

Houses are mainly located in rural areas for running their own farms or other production functions. One example of such an institution is in the United States. (Fig. 1). Gabrielle Claudus, a housing research scientist at the University of Minnesota, worked with the leadership of a church in Minnesota to provide a safe space for the homeless and create a community in partnership with this population (Housing the Homeless as a Sacred Duty – 2019 – Resource access mode: https://besettled.org/housing-the-homeless-as-a-sacred-duty). In such a project, separate industrial premises and specialized workshops are added to the necessary composition of living rooms, where homeless people learn new crafts, types of farming, and master professions that they can earn a living. It is also possible to place a separate production or enterprise on the territory of institutions. Usually, these are such industries as agriculture, clothing, woodworking, papermaking, household items and all similar industries that would be acceptable for people without special education.

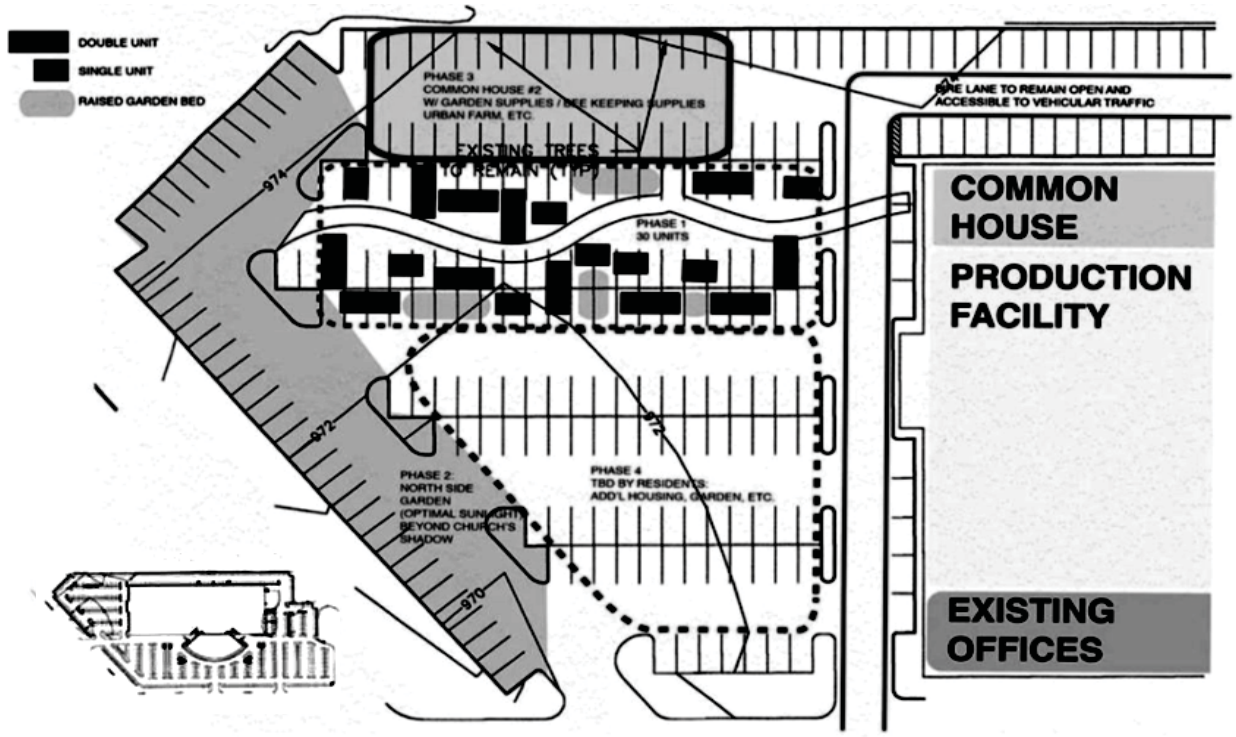

Fig. 1. General plan of a housing and production facility for the homeless in the USA

In India, in 2011, an original project of eco-housing for the shelter of women and children was implemented with its special production, namely the production of handmade tableware. The project itself has a unique general plan structure, shape, and building materials for construction (Fig. 2, 3).

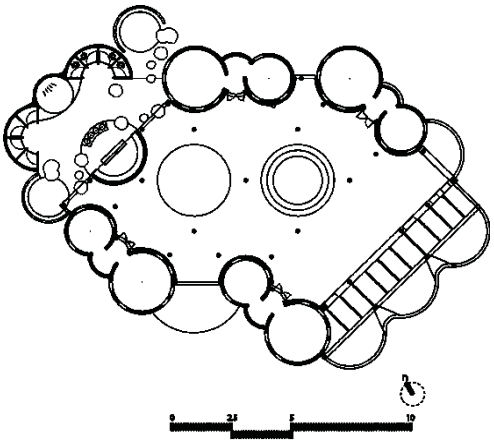

Fig. 2. General plan of housing and industrial complex for the homeless in India

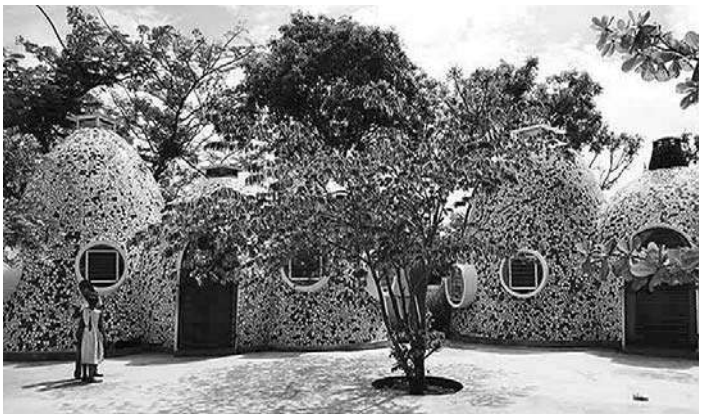

Fig. 3. Housing and industrial complex for the homeless in India

Four clusters of three domed volumes (two round bedrooms connected by an entrance hall) are built using innovative technologies: ferrocement and urban waste. The domes are formed with ground bricks and fired in a furnace for three to four days. Bicycle wheels and kitchen utensils were used as window formwork, recycled bottles were used for toilet masonry; tea glasses were used for domed tops and built-in terracotta water storage tanks (Fig. 2, 3). This project received the Aga Khan Award, which is awarded for outstanding achievements in the field of architecture, identifying and encouraging new progressive ideas that meet the needs of the public, in particular Muslims around the world (Home for The Homeless – 2020 – Resource access mode: https://www.archdaily.com/931159/home-for-the-homeless-xystudio/ 5e0b2bf 93312fd767f000523-home-for-the-homeless-xystudio-site-plan).

A European example of housing and industrial institutions for homeless people. The centre is based in Poland. (Fig. 4, 5) A gallery-type shelter with a courtyard, where homeless people often undergo psychotherapy in the warm season. In addition to living areas, there is a separate kitchen, laundry, a room for joint recreation, a room for watching films or lectures, and a sauna (Home for The Homeless – 2020 – Resource access mode: https://www.archdaily.com/931159/home-for-the-homeless-xystudio/ 5e0b2bf 93312fd767f000523-home-for-the-homeless-xystudio-site-plan). This complex accommodates 40 homeless people, including people with addiction to alcohol, drugs or games. About 15 specialists work with problem patients and help improve the lives of people in need. Such an organization belongs specifically to the housing and industrial type, although it does not have any workshops or special buildings on the territory. They cooperate with a clothing company that is located about 20–25 km from the rehabilitation complex. Every day, the bus takes residents of the institution who are ready to learn a new profession to production, where they can earn their own money, and even save money for independent living for the future. As of 2020, this rehabilitation complex, which was built in 2015, has helped more than 170 people.

Michael Malzan's American studio has completed a bright white residential complex in the Los Angeles area that contains more than 60 studio apartments and various support services for its formerly homeless tenants. Crest Apartments are built on a rectangular plot in Van Nuys, a suburban area northwest of downtown Los Angeles. The area is 45.000 square feet (4.180 square meters). The complex serves as permanent housing for those who previously did not have housing.

The five-story Cross building rises high above its low-lying neighbours. Instead of a simple block, the design team conceived the idea of assembling rectilinear volumes that vary in height. The complex has a

"stepped shape". The facades are formed by white slabs and square windows (Fig. 6). The ground level contains several public areas and supports services. In the front part of the building, there is a lobby, where the street is visible through the glazed openings and a friendly atmosphere is created. There are several spaces behind the foyer, such as the living room, laundry room and public kitchen. Tenant support services, including four consulting bureaus, are located at ground level. On the top four floors of the building, there are 64 studio apartments, 23 of which are reserved for homeless military personnel. Open-air corridors bring daylight and allow through ventilation. The rooms have white walls, grey floors and modern decor. Given the region's limited rainfall, the team selected native plants that can live in the conditions of drought. Solar collectors are located on the roof.

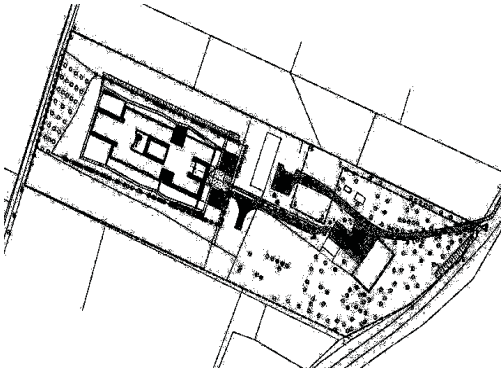

Fig. 4. General plan of a housing and industrial rehabilitation complex for the homeless in Krakow, Poland

Fig. 5. A housing and industrial rehabilitation complex for the homeless in Krakow, Poland

Fig. 6. Modern homeless facility in Los Angeles, USA

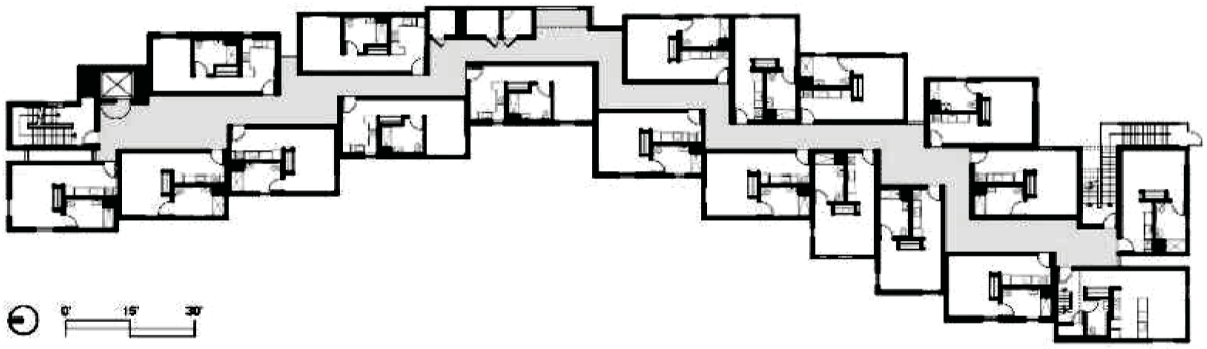

Fig. 7. Plan of a modern homeless facility in Los Angeles, USA

To understand which types of foreign housing are most suitable for introduction into domestic practice, the authors conducted a special questionnaire survey of the homeless population. From the conducted sociological research, it is clear that the biggest problem for the homeless is the lack of housing – almost 60 % of respondents answered this way (Fig. 8). It also turned out that more than 70 % of respondents have a secondary or technical education. It follows that they may have skills or already have a certain profession, so they can be attracted to various areas of production. And most homeless people prefer shelter with the provision of jobs. Also, the majority of respondents do not mind that their housing is located on the outskirts of the city.

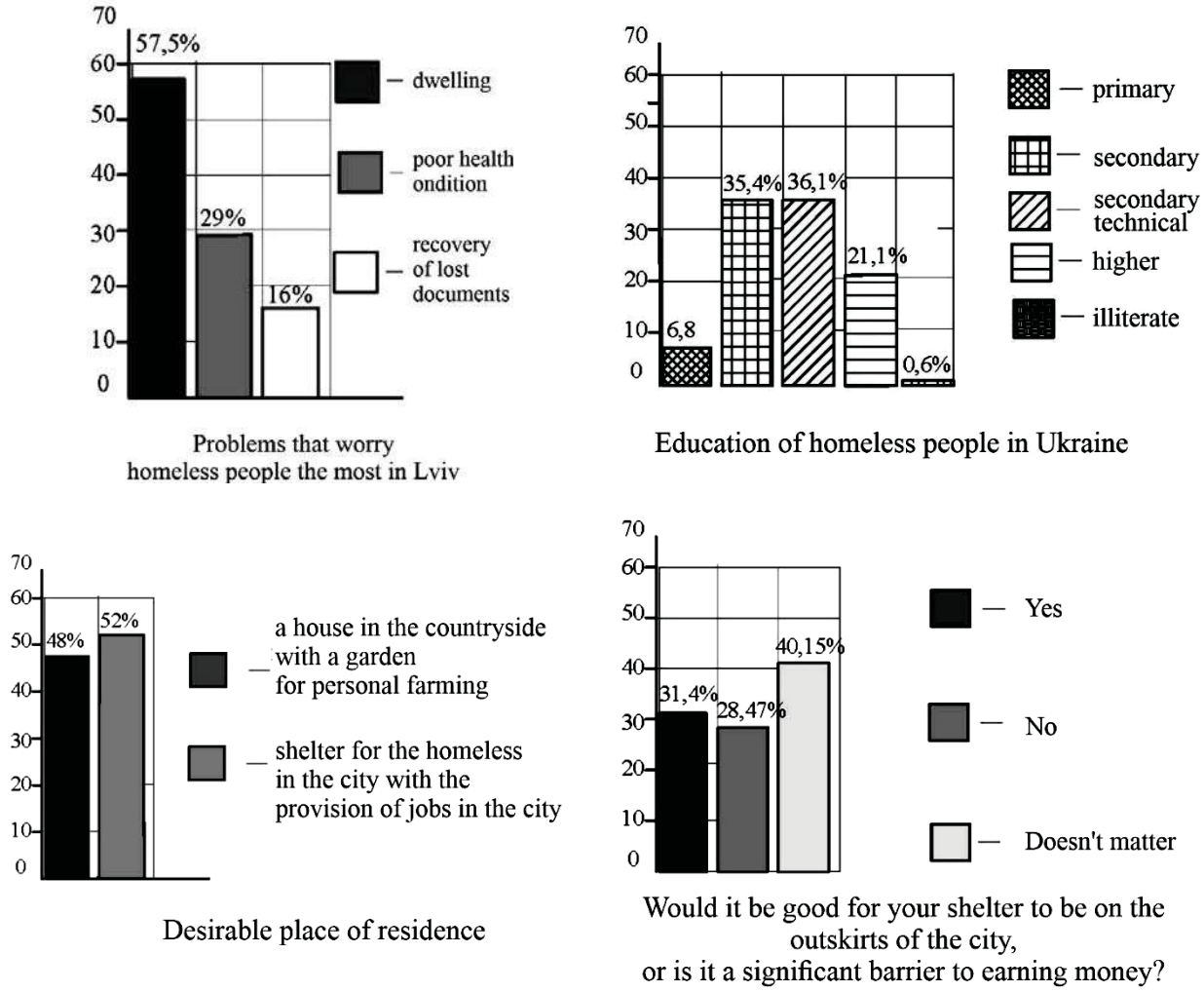

Fig. 8. Results of a sociological study of homeless people

Based on the conducted research and the study of foreign experience, we can assume that it is advisable to overcome homelessness in several stages:

– prior assistance to the homeless (overnight stay, document recovery, food, health care);
– housing with social rehabilitation functions (psychological assistance, training, mastering professions, work);
– transitional housing with support, partial or full provision of workplaces;
– social rented premises without the right to privatize and sell;
– own private or rented housing – a former homeless person returns to society.

To optimally provide homeless people with housing (achieve a satisfactory level of comfort, maximum social effect, and minimal economic costs), it is necessary to expand the typology of institutions for the homeless following the socio-demographic structure of the contingent. It is also significant to avoid segregation, but rather to integrate homeless people into society. At the same time, the decision should be such that the institutions built for them are accepted by their "neighbours" since today the attitude towards the homeless is more negative than positive.

Therefore, it is advisable to carry out the first three stages of overcoming homelessness in Ukraine using those types of institutions for the homeless that are regulated by current design norms and legislative acts.

The first stage is working on the street. At this stage, homeless people are placed in shelters or flophouses, only a part of the clients of these institutions need services of the following levels. At this stage of the fight against homelessness, it is planned to organize the activities of the social patrol service. Social workers will visit places where homeless people gather and provide them with certain types of social services. The forms of social patrolling can be different. This will depend on the needs and financial capabilities of the founders of this service: starting with information and explanatory work and ending with a range of services: distribution of food, clothing, shoes, medical care, transport services, and so on**.**

At the registration centre, homeless people should be issued a certificate of registration and information and explanatory work should be carried out on possible ways to solve their problems. Having a certificate will allow you to restore lost documents and get registration of the preferred place of residence, which is the main one in the system of reintegration of homeless citizens.

The second stage is housing with social and psychological rehabilitation functions. At this stage, homeless people receive psychological, legal, medical and social assistance, ***study, master new professions, work in these institutions*** and live for a certain period (depending on the rehabilitation that each homeless person undergoes individually). That is, at this stage, homeless people are undergoing both labour and psychological rehabilitation.

The third stage is housing with support for independent living, provided by social organizations designed to deal with the problems of the homeless. Such housing at this stage can be a social dormitory, where people can live for a certain time until they can rent their own housing.

The fourth stage is transitional rental social housing with the support of social workers. This is a new hotel-type housing that needs to be built for homeless people of various categories, for those who have passed the previous three stages. The housing is intended for independent living, that is, homeless people rent housing on their own. Housing is provided without the right to privatize and sell. Residents pay their own rent and utilities. This is already a form of social housing.

Not all homeless people have to go through all the stages. Some categories (for example, children from orphanages who are no longer underage, or people who have been released from prison) can start from intermediate stages, that is, immediately settle in social dormitories, or in rental social housing – in the future, their own housing.

So, by creating new types of housing for the homeless with gradual stages of transition to higher levels of support and accommodation, it is possible to solve several priority problems:

– avoid isolating homeless people from other people, but rather integrate them into society;
– provide housing for people from orphanages;
– provide temporary housing for former prisoners and ensure their return to normal life;
– solve the problem of homeless families;

– solve problems with homeless employment: design of industrial and agricultural facilities at the facilities for the homeless.

– reallocate the resources for the construction of housing for the homeless (by reducing the range and area of auxiliary and cultural and leisure premises, and more comfortably solving the layout of the residential part of the houses).

Rand social adaptation centres with the provision of the job should be located outside the city limits, or in rural areas. The homeless person will undergo psychological rehabilitation, and provide for a living, earning money from agricultural work, construction, workshops, and women will do household chores.

The problem of social employment of some able-bodied homeless people can also be solved by placing small service apartments in residential and public complexes for resettling service personnel (security guards, cleaners, janitors, gardeners).

After analyzing the foreign experience of forming housing for the homeless and summarizing the results of our sociological research, we concluded that special attention should be paid to housing with a productive function. This housing is designed for homeless people who do not have a permanent job. For homes in rural areas, it is planned to employ homeless people in agricultural work, on the periphery of the city – in production workshops, enterprises and construction sites. In institutions of this type, training classes are needed where homeless people can study or get a new profession for themselves. For institutions in the structure of urban development, there may be open premises for servicing residents living near this house (shared laundry, auto workshop, shop, barbershop, cafe, etc.), which can be served by homeless people. This type of institution will allow homeless people to undergo social adaptation, restore normal physical and mental health, provide them with jobs, livelihoods, and at least partially cover the cost of living in this type of institution.

Conclusions

1. On the planet, 2 % of the population is homeless. In most countries, the number of homeless people is growing from year to year. To reduce the number of people without a permanent residence, you need to understand the causes of homelessness: poverty, unemployment and unstable employment, migration to urban centres, lack of affordable housing, divorce, family breakdown, domestic violence, lack of social or family support, drug addiction, mental health problems. Also, lack of support or services for those leaving youth centres, incarceration, mental health hospitals, etc.; discrimination based on origin, age, or sexual orientation; low schooling, social isolation, and low self-esteem.

2. Housing and industrial institutions for the homeless are projects in which educational and industrial premises, specialized workshops are added to the usual composition of living rooms, where homeless people learn new crafts, types of farming, and master professions that they can earn a living. It is also possible to place a separate production or enterprise on the territory of institutions. Production should be such that it can be mastered by people without special education. These are usually industries such as sewing, woodworking, papermaking, household items, building structures, and agriculture. The specific choice of production in such institutions depends on the country, region and their specialization.

3. For housing and industrial organizations, it is not necessary to place production facilities on the territory of the institution. It is also possible to cooperate with businesses that are located nearby. With the help of a transfer, people get to work, learn new skills and get paid. This type of institution will allow homeless people to undergo social adaptation, restore normal physical and mental health, provide them with jobs, livelihoods, and at least partially cover the cost of living in this type of institution.

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ТИПИ ЖИТЛОВО-ВИРОБНИЧИХ ЗАКЛАДІВ ДЛЯ БЕЗДОМНИХ В ЗАРУБІЖНІЙ ПРАКТИЦІ

Анотація. *Розглядаються приклади проектування закладів для бездомних в зарубіжній практиці. Зарубіжний досвід співставляється з результатами власних соціологічних досліджень бездомних в Україні. Категорія бездомних – це невід'ємна складова населення будь-якої країни, яка завжди була присутня в різних типах суспільства, незалежно від рівня його заможності і соціальної формації. Для вирішення проблеми бездомності пропонується соціально-типологічна схема впровадження для бездомних різних типів житла, на основі його інтеграції з виробничими і навчальними функціями.*

Пропоновані житлово-виробничі заклади для бездомних – це проекти, у яких до звичного складу житлових одиниць додаються навчальні і виробничі приміщення, спеціалізовані майстерні, де бездомні навчаються новим ремеслам, видам господарства, опановують фах, за допомогою якого можуть надалі заробляти на прожиття. Також можливе розташування окремого виробництва або підприємства на території закладів, або в приміській зоні і навіть в сільській місцевості. Виробництво має бути таким, щоб його змогли опанувати особи без спеціальної освіти. Зазвичай це такі галузі: швейна, деревообробна, виготовлення паперу, побутових речей, будівельних конструкцій, сільське господарство. Конкретний вибір виробництва у таких закладах залежить від країни, регіону та їхньої спеціалізації.

Для житлово-виробничих організацій не обов'язково розташовувати виробництво на території закладу. Можливо й співпрацювати з підприємствами, яке знаходиться неподалік. За допомогою трансферу люди потрапляють на роботу і освоюють нові навички та отримують заробітну плату. Такий тип закладу дозволить бездомним пройти соціальну адаптацію, дасть змогу відновити нормальне фізичне і психічне здоров'я, забезпечить їх роботою, засобами до існування та дасть можливість, хоча б частково покрити вартість свого проживання в такому типі закладу.

Ключові слова: *безпритульність, бездомність, житло, притулок, соціальні послуги, виробництво, навчання, соціалізація.*

ARCHITECTURAL STUDIES

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THE ARCHITECTURE OF WOODEN TEMPLE BUILDINGS - MODERNITY AND THE FORM OF IDENTITY

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Abstract: Understanding the tradition, innovation and national identity of examples of wooden temple buildings, in particular, Ukrainian churches, certain trends are identified, which in their essence become the main ones, regarding the intensity of development in temple construction. The factors of tradition and innovation are identified as important mediums for establishing the national identity of the image of wooden temple buildings, and their expression in the modern temple-building process of creating a Christian shrine.

Key words: tradition, innovation, identification, sacral, principles, form creation, temple construction, phenomenon, national identity.

1. Introduction

In general, the concepts of tradition, innovation and national identity of examples of Ukrainian church architecture, and wooden temple buildings, in particular, reveal certain trends that are essentially the main ones in terms of the intensity of development in temple construction. They preserve the integral structure of the planning and spatial component of the church (temple) building and its important – or even the most important – feature of the expression and identification of the sign-image, the presence of sacrum in the spatial aspect of its creation. The same as in the structure of the architectural and artistic environment formation there is the autochthonous people and their national identity. Therefore, there is a need to identify the factors of tradition and innovation as important means of establishing the national image of the identity wooden temple buildings of Ukrainians and neighbouring territories of Poland, Slovakia, the Czech Republic or Romania, which through its inherent features of shaping, fixes places and territories inhabited by the Ukrainian ethnic group, creating at the same time an architectural-spatial and figurative phenomenon of wooden temple building of Ukrainians, Poles, Czechs, Romanians and others (Gnidets RB. 2007, P. 2–5).

2. Basic Theory Part

Tradition is one of the most important components and mediators of creation and progress in the development of church (temple) architecture. On a historical and national basis, we can, thanks to it, see ways of

creation on certain principles and means of expressing national features and signs that manifest themselves in the architecture of church buildings. In fact, through them, the temple building acquires certain outlined features and forms of its identification and integration in the existing spatial environment and a certain forming structure. Innovation in church and temple architecture, despite certain established canonical, figurative-symbolic and hierarchical foundations of creation, is a significant factor in the search for spatial planning solutions. In general, this is a modern approach to expressing an idea-form, materials, architectural and structural solutions and searches. It also manifests itself in the fundamental features and principles of shaping, planning and architectural and spatial structure, as well as the formation of the environment – the place of manifestation of all the sacred essence in the temple construction of shrines. And in the concepts of identity, national identity remains one of the most important and complete, since what is meant by national identity covers both the culture, ethnic and political components inherent in both political and cultural communities. In the modern understanding, it consists in belonging to a "people", that is recognized as a "nation", namely in aspects: mutual, common coexistence of people; common historical past; common active identity; permanent residence in one country and common characteristics, united by the concept of "national character" and form a national culture. Therefore, collective national identity presupposes the existence of a certain national community, which, by E. Smith, "has its name, its historical territory, common myths and historical memory, a common mass and social culture, a common economy, and the same legal rights and obligations for all its members. " Thus, the identity of a particular national community can be represented rather as its collective self-consciousness, self-determination, self-development of its image and content of self-consciousness, rather than as an outwardly constructed image of a "national character" (Vechersky V. 1994, P. 102–113).

Attachment to certain territories or localities within their borders is mythical, subjective in nature, attachment and association are more important for identification than living on a certain (territory) of land or owning it. This place to which we belong is more often interpreted as a sacred land, the land of our ancestors, our kings and sages, poets and priests, builders and our legislators – all this turns this region into our homeland. E. Smith also emphasized defining the role of art in shaping the nation. The language and symbols of the national revival help artists search for motifs, genres and forms that distinguish them from the classical ones. In architecture, along with the revival of historical styles, at the end of XVIII – the beginning of XX century began the search for their own "national" styles, like Ukrainian baroque, and later it went to the tradition of folk construction, hence the "zakopyansky" style, etc. There appeared Ukrainian architectural art nouveau or Ukrainian architectural style. Art in a general sense contributes to the establishment of identity and unity of the community, reminding fellow citizens of their cultural ties and political kinship. Through ceremonies, customs, traditions, and symbols, each member of the community participates in its life. Therefore, this customary symbolic aspect is extremely important for the success and stability of national identity. Symbolic ceremonies and Customs revive ethnic ties and ethnic identification, the spirit of sacrifice and heroism. So art, thanks to its immanently inherent capabilities of emotional and psychological influence, expresses one of the most powerful means by which national identity is formed or established in society. The specificity of architecture as an art determines the features of visualization of verbal and spatial myths and their transmission from one generation to the next. With the change of power political preferences in architecture, the search for new means of expressing social changes immediately begins, that is, the search for new vivid metaphors and understandable meanings and forms. The very process of changing (transforming) national identity can occur in both evolutionary and volitional (voluntaristic) ways. At the beginning of the twentieth century, in contrast to this, architectural forms of the modern architectural style were developed, which was carried out under the influence of the tradition of folk architecture and modern examples, and due to this, its creation did not allow it to drown in archaism or extreme nihilism. Therefore, a conscious appeal to the national traditions of creation was the approval of the mandatory identification of the national identity of the image and form of the building. (Zhuk R. 1991, P. 38–45).

The phenomenon of the Ukrainian wooden church, and in particular its architectural and constructive expression, reveals an outstanding phenomenon of not only European but also world architectural thought. The builders of these shrines developed the achievements of Ukrainian folk architecture, expressing the abilities, energy and achievements of their predecessors. The specific features of Ukrainian wooden temple construction consisted primarily in the fact that the buildings have a log structure made of underground (horizontal) logs connected in the corners by locks of various systems. In the West, in particular in northern Europe (Norway, Denmark and partly Finland), a frame system close to the classic "riser-beam" was widely used. This system limited the creative possibilities of builders because it did not reveal the internal space. On the contrary, the log system opened up a wide range of opportunities for searching for original solutions to both the volume-planning structure of the temple building and the high-rise disclosure of its internal space. The appearance of Ukrainian

wooden churches is distinguished by an organic combination of forms, successful coexistence with the environment, which is a significant feature of almost every national construction art. But even more exciting is the temple's interior NOTHING. Its peculiarity lies in the specific artistic means of organization, which is determined by the order of grouping log cabins by axes, united by shaped gaps-cutouts and a harmonious combination of a small number of components-log cabins, tops with creases, subordinated to the unfolding and high-rise opening of the church space. NOTHING But even more exciting is the temple's interior NOTHING. NOTING. A special feature of the architecture of Ukrainian churches is the overlap of each part in the layout with a pyramidal top on a square base. Varieties of tops are combined, that is, the bottom is square, and the higher parts are faceted. Creases with different slopes, lighting, size ratios made it possible to create a peculiar tempo and rhythm of this unfolding of space, getting various architectural and artistic effects: tension or calmness, grandeur or lyricism, severity or joy. Here you can see an inexhaustible range of shades: harsh and heroic, restrained intimate or solemnly majestic. (Sirohman M. 2016, P. 154–176).

3. Results and Discussion

The image and architectural-spatial expression of the temple building and the place of its localization thoroughly records and indisputably indicates that the Ukrainian ethnic group lives on this territory, city or town, which in this way in figurative and existential aspects confirmed and justified its identity and property in spiritual and mental identification. Churches become like fixators of the historically determined ethnic existence of the people among others, and thus confirm their original right to identify their place and its expression in this way in the sacred, spiritual and material dimensions. Ukrainian temple construction, the main component of which is its nature of origin, has developed its views, tastes, rules and norms. It has high stability, changes under various influences only in some details, but without changing its forms and its concept of their planning and compositional solutions. The "area of stability" of our sacred construction was so strong that the image of the Ukrainian church becomes a symbol of the nation, a" threshold " beyond which the builders tried not to go, given that changing the concept of planning, compositional and architectural-figurative solutions become a betrayal of their faith and people. And this factor remained quite strong. The influences of historical styles that took place in Ukraine were subject to this concept, so the architecture of the Ukrainian church can be immediately distinguished from others. Temple construction of the late XIX – early XX centuries in Ukraine, and then in Galicia and Transcarpathia adhered to this rule, according to which artists and architects worked, namely V. Krichevsky, V. Sichinsky, I. Levynsky, S. Tymoshenko, O. Lushpynsky, I. Trush, K. Zhukov, V. and E. Nahirny, O. Slastion and others. The existence of powerful internal factors in our temple construction is indicated by the fact that the Ukrainian style in the construction of churches has existed for many centuries, despite the lack of Ukrainian statehood and the intentions of the colonizers to destroy it in various ways. An important role in the emerging of the national and cultural movement in Galicia belonged to the UGCC (Ukrainian Greek Catholic Church), which was and remains the bearer of Ukrainian ethnicity and identity. (Gnidets R.B. 2009, P. 108–132).

If we look in more detail at the samples of the Ukrainian wooden church of the border in the west of Ukraine, in particular, Boykivshchyna, Bukovina, Hutsul region, Transcarpathia, Carpathian region of Poland, Slovakia, Czech Republic and Romania, we can see that they are dominated in temple construction by such types of churches and schools as Boykivsky – with developed come completion, with creases on three parts planning basis; Hutsul – predominant crossed basis, one– or five-storey completion of the main volumes of churches; Transcarpathian school it differs precisely in that on a two– or three-story layout, either one top is placed on a high square tower, or it fixes the entrance part and small additions in the form of a signature on a square base rise above the main altar. The Lemkiv type of church is a pronounced three-story planning structure with a high tower-dome and separate sloping roofs over the altar, ending in tiered spherical domes with lanterns. And finally, the Bukovyna School of temple construction is in most cases a home-type church, with a solid high roof over all the planned parts of the space and fixing the internal dome space on the outside with a signature or a small dome, on a square or faceted base. Such a variety of architectural types and schools in Ukrainian wooden temple construction only confirms such a fantastic richness in their three-dimensional, planning and figurative-expressive embodiment, as well as a natural symbiosis with the surrounding environment and harmony in general. The listed types and schools of wooden temple architecture are represented by the following examples of buildings that reflect the inherent national features and trends in temple construction. These are, in particular: the Church of St. Mikhail, 1869, Tysovets village, Skolivsky district, Lviv region; Church of the the Nativity of the Blessed Virgin Mary, 1838, Matkiv village, Turkivsky district, Lviv region;

Church of St. Nicholas, 1588, Svalyava town, Transcarpathian region; Church of the Intercession of the Blessed Virgin Mary, 1645, Kostryka village, Velykobereznyansky district, Lviv region; Church of St. St. Nicholas, 1604, Dibrova village, Tyachivsky district, Transcarpathian region; Church of St. St. Nicholas, 1428-XVIII century, Serednie Vodiane village, Rakhiv district, Transcarpathian region; Church of the Nativity of the Blessed Virgin Mary, 1615, Vorokhta village, Yaremchansky district, Ivano-Frankivsk region; Church of the Annunciation to the Blessed Virgin Mary, 1587, Kolomyia town, Ivano-Frankivsk region; Church of the Holy Trinity, 1774, Chernivtsi city (suburb of Klokuchki); Church of St. Ivan Suchavsky, 1792, Vizhanka village, Vizhnytskyi district, Chernivtsi region. There are also examples of wooden churches, such as Annunciation of the Blessed Virgin Mary and St. Teklia, 1734, Tadani village, Kamianko-Buzky district in Lviv region; St. Michael's, 1765, Dmitrovichi village, Pustomytovsky district, Lviv region; Chapel of St. Peter and Paul, 1900, Vovche village, Turkovsky district in Lviv region or the Church of the Intercession of the Blessed Virgin Mary, 1938, Nyzhniy Komarnik village near Dukli town, eastern Slovakia, arch. V. Sichynsky (Lypka R. 2001, P. 432–448) (Fig. 1).

Fig. 1. Church of St. Nicholas, 1588, Svalyava town, Transcarpathian region (a);
Church of the Nativity of the Blessed Virgin Mary, 1615, Vorokhta village, Yaremchansky district, Ivano-Frankivsk region (b);
Church of the Intercession of the Blessed Virgin Mary, 1938, Nyzhniy Komarnik village near Dukli town, eastern Slovakia (c);
Church of St. Illia, 1930, Dora village near Yaremche town, Ivano-Frankivsk region (d)

The features and principles of the formation of wooden temple buildings that we have revealed have allowed modern builders to take advantage of this architectural diversity and richness of traditional temple construction and expression that reflect one or another type of architectural school, in particular, Boykivska, Hutsul or Lemkivska, Transcarpathian and Bukovyna. This is the Church of the Assumption of the Blessed Virgin Mary, 2010, Zhnadievo village, Volovets district, Transcarpathian region; Church of the Ascension of the Lord, 2006, Mezhgirya-Potochyna village, Mezhgirsky district in Transcarpathia; Church of Christ the Tsar, 2010, Luhy village of the Rakhiv district in Transcarpathia, arch. M. Kravchuk; Church of the Ascension of the Lord in Ternopil town, 2016, arch. O. Dzhula and D. Chepil; Church of Archangel Michael in the Plavye village (Plai Recreation Complex) in Lviv region and others (Fig. 2).. Considering rather rich heritage of wooden temple construction of our neighbours – Poland, Slovakia, the Czech Republic, Romania and Hungary – we are convinced that unfortunately, their wooden shrines remained as only a historical and artistic memory of the tradition of sacred architecture. And wood as the material embodiment of the temple for some reason turned into an archaic means of expressing ancient traditions, and not revealing modern trends in temple construction, where preference is given only to brick, concrete or various composite materials. There are only a few examples that reflect the trends of modern wooden construction of shrines, in particular in Poland, which was rich in traditional churches of various styles of the XVII–XIX centuries. This is the Church of Societas Divini Salvatoris in Zakopane 1958-1968, which in the 1980s became a parish and chapel in Tarnov na Mazovsha city, 2007–2011, arch. M. and L. Rovinscy. (Fig. 3). Simple forms, imagery close to Gothic temples (but only plays the role of constructiveness) and the creation of sacred spatiality and traditional structuring of the surface. Strangely, even those countries where wood was one of the main building materials, in particular, the North and East of Europe, wooden temple construction remained as a reference, with single examples of shrines, and then often only in "reserves"– skansens and open-air museums. Industrial production of various structural elements or entire structures in residential and public architecture is developing, but unfortunately, the poetics and aesthetics of wood as a material for the construction of temples are no longer there, and it is being lost or has already been lost (Shevtsova G. 2007, P. 324–356).

a

b

c

Fig. 2.
Church of the Assumption of the Blessed Virgin Mary, 2010, Zhnadievo village, Volovets district (a);
Church of Christ the Tsar, 2010, Luhy village of the Rakhiv district in Transcarpathia (b)
Interior of Church of Christ the Tsar, 2010, Luhy village of the Rakhiv district in Transcarpathia (c)

a

b

c

Fig. 3.
Main entrence side of chapel in Tarnov na Mazovsha city, 2007–2011 (a);
Altar side of chapel in Tarnov na Mazovsha city, 2007–2011 (b)
Church of Societas Divini Salvatoris in Zakopane 1958–1968 (c)

4. Conclusions

The tradition of Ukrainian wooden churches is quite an important and integral factor in the formation of their typical models, in particular, three– or crossed-types of planning, high-altitude and spatial development of the temple structure, which ends with one, three or more domes. Their shape (namely dome endings), mainly pear-shaped, elongated up semicircular or pyramidal, create a characteristic national image of the Ukrainian temple. Innovation as a modern manifestation of the same tradition of temple building in Ukraine and abroad is a kind of attempt in modern times, under the means of the form of construction and material (namely wood), to give new life, a new interpretation of the established tradition, as a manifestation of respect for it in the implementation, not as a certain way of its vulgarization and simplification. These two factors – traditions and innovations – serve as an important basis for understanding and identifying the phenomenon of the national identity of the image of Ukrainian church wooden architecture and architecture in general in Ukraine and those spaces where Ukrainians and the Ukrainian ethnic group are located and live. This is the identification of certain cultural, historical-political and architectural-spatial features, which, of course, form this identity by the property of the place and territory inhabited by the Ukrainian autochthonous people, and is a reflection of this people through the materialized image and essence in temple construction as an expressive phenomenon of its creative potential.

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АРХІТЕКТУРА ДЕРЕВ'ЯНИХ ХРАМОВИХ БУДІВЕЛЬ – СУЧАСНІСТЬ ТА ІДЕНТИЧНІСТЬ ОБРАЗУ

Анотація. *В розумінні традиції, новаторства та національної ідентичності взірців дерев'яних храмових будівель, зокрема, українських дерев'яних церков виявляються певні тенденції, які за своєю сутністю стають головними, щодо тяглості (тривалості) розвитку в храмобудуванні. Проявляються чинники традиції і новаторства, як важливі середники утвердження національної ідентичності образу дерев'яних храмових будівель, і їх вираження в сучасному храмобудівному процесі творення християнської святині. Традиція українських дерев'яних церков є достатньо важливим та невід'ємним чинником у формотворенні їхніх типових взірців, зокрема, тридільного або хрещатого типів розпланування, висотно-просторового розвитку храмової структури, що завершується однією, трьома або більше банями. Їх форма (саме баневих завершень), переважно грушевидна, видовжена догори, півциркульна, пірамідальна або їх різновиди, творять властиво національний образ українського храму. Новаторство як сучасне втілення тієї ж традиції храмобудування в Україні та за її межами є своєрідним намаганням у новітні часи, під засобом форми конструкції та матеріалу – дерева, надати нове життя, нової інтерпретації усталеній традиції, як виявлення до неї поваги та пошани у втіленні, а не як певний спосіб її вульгаризації та спрощення. Ці два чинники – традиції та новаторства – виступають важливим підґрунттям для усвідомлення та ідентифікації феномену національної ідентичності образу української дерев'яної церковної архітектури і архітектури загалом, у просторі України, і тих просторів, де перебувають і живуть українці, український етнос.*

Ключові слова: *традиція, інновація, ідентифікація, сакральний, принципи, формотворення, образ, храмобудування, феномен, національна ідентичність.*

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TERRITORY OF VICHEVA SQUARE AND PROBLEMS OF ITS ARCHITECTURAL RENOVATION

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Abstract. The article is devoted to the historical features of the formation of Vicheva Square in Lviv and its current state. The work focuses on the historical background of the square planning, its development during Soviet times and degradation as space nowadays. The main tasks are architectural approaches and ways of the renovation of the area.

Key words: Renovation, Vicheva Square, Lower castle, Vernisage market, Lviv, heritage, publik space, square.

Problem statement

Due to the development of the Sustainable Urban Mobility Plan and the Integrated Concept of Lviv City Development, it became necessary to evaluate the functions and update the vision of the development of many points in the city. Moreover, the problem is what to do with the areas, which have great historical importance in the urban structure, and now they are in poor condition or used for a strange purpose. This is exactly the situation with the Vicheva square in Lviv, on which a part of the Low Castle was located, and today there is a market and car parking.

Analysis of recent research and publications

The studies of the following authors are devoted to the research of the Lower Castle in Lviv, namely: Y. Vitvitsky, I. Kachor, I. Mogytych, F. Markovsky, D. Shvets, O. Konyuk, R. Mogytych, A. Cholovsky (R. Mogytych, 2000). The problems of the city's public spaces have been studied, among the main sources of information are the founders of the topic K. Zitte and D. Lynch, as well as authors: J. Gayle, C. Montgomery, L. Gemsoy, J. Jacobs, F. Thibalds. The following Ukrainian authors explored the topic of public space in urban areas: M. Bevz, O. Rybchynsky, B. Cherkes, O. Kryvoruchko, H. Prtryshyn and others.

Purpose of the article

The purpose is to investigate the historical background of the square formation and determine under the historical data the zoning of the square and its spatial organization to do a basic analysis before design and renovation proposals.

The main material

Historical Background of the territory.

The first historical mention of the Low Castle is dated 1292. The king Lev Danylovich (Leo I of Galicia) built a castle in 1270 in the valley of river Poltva (northwest corner of today's Lviv city centre) and later moved his yard here from the High Castle. In 1340, when Lithuanian prince Lubart tried to seize Lviv, the Low Castle was strongly damaged, however, was rebuilt soon. In 1353, prince Lubart ordered the city to be burned and the rebuilt fortress was destroyed again.

Due to the danger of war with the King of Poland Casimir III, in 1345 and 1349 in Lviv, due to the orders of Lev Yurievich (killed in 1323), the city fortifications and the Low Castle were also strengthened. In the 1360s, the construction of the Low Castle was carried out (R. Mogytych, 2000).

Low Castle was named so in contrast to another, the High Castle, which was on a mountain in the northeast part of the city. Being built in 1270, it belonged to the ancient buildings and later became part of a new enclosed "downtown". On the territory of Low Castle, there was a stone chapel of St. Catherine of Alexandria, which was originally an orthodox church. After the conquest of Lviv by the Polish King Casimir, the castle served as the unofficial royal residence. He was repeatedly aware of the damage, in particular during the attacks of Lithuanian Prince Lubart in 1340 and 1353; from the fire of 1565; during the robbery of the city by Swedish troops in 1704. It was rebuilt multiple times. Due to lack of funds, it gradually declined and in 1802 was dismantled for construction material. Nowadays, the territory where the castle was located is partially occupied by the drama theatre, partly by the building of the National Museum. Some part of the territory is not built up, it has a souvenir market and named Vicheva square. The short street that crosses the territory where the castle used to be (between the National Museum and the market) was named Low Castle in 1991. Nowadays, no archaeological studies have been carried out regarding the former castle territory (R. Mogytych, 2000).

Current situation of the territory

At the site of Vicheva square is located Vernissage – a landmark location in Lviv – the market for paintings, art products, souvenirs, and antiques. Vernissage began in the epoch of "Perestroika" in Soviet times, at the intersection of Krakivska and Virmenska streets thanks to the artists. They were the first who put their works up for sale here. Then, masters of other creative crafts joined them. The art festival "Vyvykch", which took place in Lviv in 1990 and 1992, had a great influence on such displacement. (Fig. 1)

Fig. 1. Location in Lviv city center and territory of Low Castle. Source: Danylo Plesnytskyi

Since 2008, attempts have been made to demolish "Vernissage" under various pretexts: from "streamlining" to building a hotel. Such plans by local authorities have provoked a public complaint, and Vernissage remained. Since 2013, the Lviv City Council decided to arrange a spontaneous artistic goods market.

Therefore, once this territory had its own built structure, but it was subsequently lost and an area formed like a city square. Part of the square was built up during the next development period of the city with the appearance of large public buildings that became the landmarks of the place: a theatre and a museum. This area has historically been formed as a public place: a meeting place in the middle of the castle, later a square in front of the theatre, today a square for the sale of works of art.

Nowadays, this area has been an attractive place for people and looks like a gift shop for tourists.

Fig. 2. Low castle, today's use of space. Source: Olha Kryvoruchko

The main features of the place: randomness, lack of visual orientation, disordered human movements, and loss of any memory of the place. Its chaotic space without its face.

At the moment, there were no thorough archaeological researches in the territory of Vernissage, and it is impossible to confirm the location of the historic Low castle and its cathedra on the modern plan of the city. However, theoretical attempts were made to find out what was hidden underground (Fig. 3, 4).

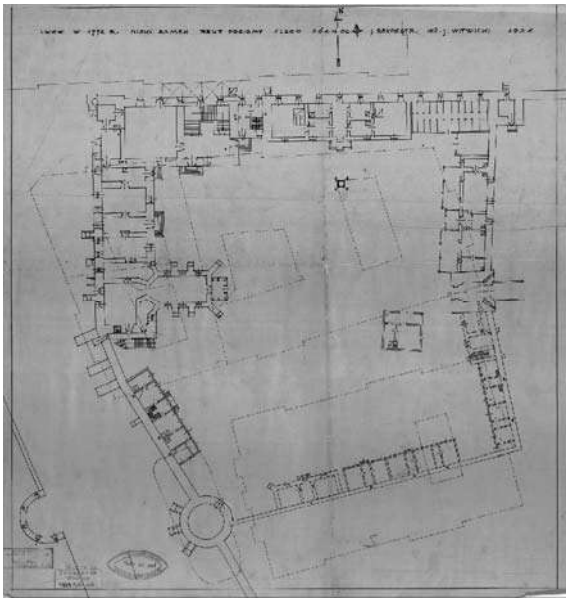

Fig. 3. Low castle, 1772 by J. Witwicki
Source: Zabolotny library

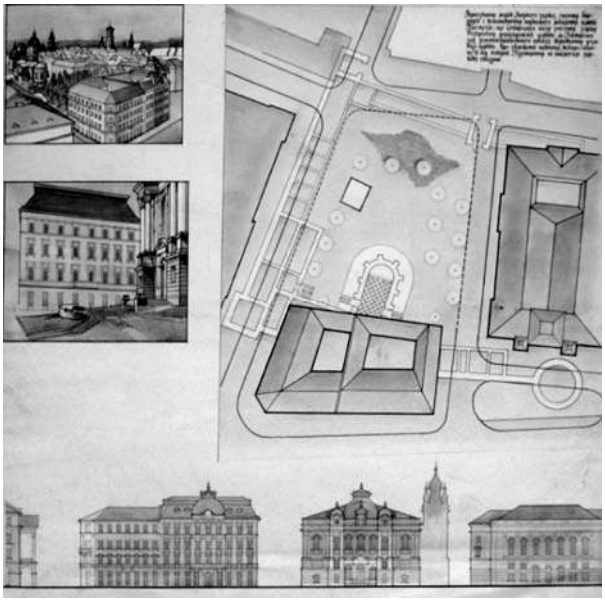

Fig. 4. Low castle 2nd variant (Nizki zamek)
Source: Oleksandr Konyk 1993

Having analyzed the previous theoretical works, we have found out that the layout and lines of the modern buildings of streets and quarters on the site of the Lower castle correspond to the research of Janusz Vitwitski. From his reconstruction plan, it is clear that after the demolition of the fortifications and all the buildings of the castle there were created the directions of streets and the location of the buildings.

Problems of the territory

One of the main problems of the place is the loss of its historical identification. Nowadays, this area is not identified with either the historic Low castle or the square in front of the theatre. Although the art market has also become a very important element in the structure of urban landmarks. It is not enough for Vicheva Square to have its characteristic, recognizable and unique face. It deserves to be called the oldest part of the city and the place of residence of the monarch during centuries.

Although this area belongs to the pedestrianized part of the historic centre of the city. It is difficult for people, mainly due to the presence of the market, large crowds of tourists, as well as too tight parking of market vendors and visitors to the city centre. Also, a part of the square has been converted into a paid parking lot, which, however, does not completely satisfy the parking needs. All this does not contribute to the attractiveness and comfort of the territory (Fig. 5, 6).

Another aspect of the area is that it is located in a closely built-up downtown area with a small percentage of green spaces, as well as overheating and heavy pollution. Also, due to the density of the building, this area is hardly ventilated. Thus, the lack of green spaces with good landscaping deeply affects the quality of the space.

Strong connections with the environment and existing city network (pedestrian streets and other public spaces), combined with the improvement of the quality of the space itself (also its microclimate and aesthetics) would give a positive result on the way of renovation of the Vicheva Square. Besides, the implementation of a small transport ring will provide good results.

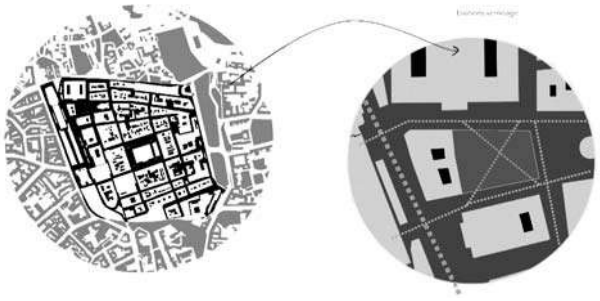

Fig. 5. Pedestrian connections of tourists and residents of the city.
Source: Danylo Plesnytskyi

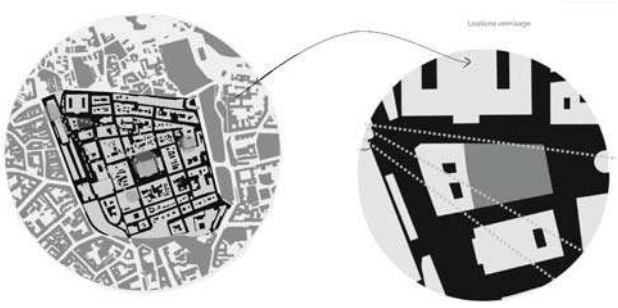

Fig. 6. Pedestrian connections of tourists and residents of the city in structure. Main attractive points.
Source: Danylo Plesnytskyi

The first diagram reflects the unconditional pedestrian connections of tourists and residents of the city. It is characterized by the shortest marches along the diagonal and seamless lines The second diagram reflects the unconditional pedestrian connections between tourists and city residents from the Opera House and Rynok Square. The main attractive points are Opera House, Rynok Square, Dominican Cathedral and Chapel of Boims.

Conclusions

Therefore, analyzing the historical background and all aspects of the area, we can make the conclusions. The situation we have now is a chaotic organization of public space that is surrounded by parking and territory, cut off from the rest of the downtown. The remains of the Low castle and the foundations of other build structures are underground. It is unknown at present what archaeologists could find, but their findings will certainly be valuable, and the opportunity to exhibit them is certainly real. Also, by analyzing the connections of the city's major landmarks, points of attraction for visitors and the pedestrian lines that people move daily, we can conclude that this area is hindering the natural movement of people by a

disruptive market and creating traffic chaos. Therefore, starting with any steps towards the renovation of the Vicheva Square, apart from the analysis of the historical component and the data of future archaeological researches, it is necessary to pay special attention to the movement trails and the comfort of staying for people in this area in their everyday city life.

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ТЕРИТОРІЯ ПЛОЩІ ВІЧЕВОЇ ТА ПРОБЛЕМИ ЇЇ АРХІТЕКТУРНОЇ РЕНОВАЦІЇ

Анотація. *У статті досліджується історичне підґрунтя утворення сучасної площі Вічевої та визначення відповідно до історичних даних її ролі у сучасній структурі міста Львова. Також предметом зацікавлення є містобудівний аналіз, що був проведений на рівні дипломного проектування для напрацювання архітектурних пропозицій та рекомендацій.*

Низький замок має назву на противагу іншому – Високому Замку, що знаходився на горі, на північному сході міста. Найдавніша згадка – 1270 роки, у зв'язку з перенесенням сюди помешкання короля Лева Даниловича, він належав до найдавніших будівель, і пізніше став частиною нового середмістя. На території Низького замку була кам'яна каплиця

святої Катерини Олександрійської, яка спочатку була руською церквою, про що свідчили описи про багаті розписи її інтер'єрів. Після завоювання Львова польським королем Казимиром ІІІ замок служив неофіційною королівською резиденцією. Йому неодноразово завдавалася шкода, зокрема під час нападів литовського князя Любарта в 1340, 1353 роках; від пожежі 1565 р.; під час пограбування міста шведськими військами в 1704 р., проте він відбудовувався багато разів. Через брак коштів на підтримання в належному стані, будівлі Низького Замку поступово занепали, і були остаточно розібрані в 1802 р., а частина вивільненої площі перетворена під торгову площу. Нині територія, де був замок, частково зайнята драматичним театром, а частково будівлею Національного музею. Деяка частина території не забудована, вона містить ринок мистецьких творів і сувенірів Вернісаж, це площа Вічева. Коротка вулиця, що перетинає територію, де раніше був замок (між Національним музеєм та площею Вічевою), отримала назву Низький замок у 1991 році.

Аналізуючи історичне підгрунтя та всі аспекти сучасної містобудівної ситуації, ми можемо зробити деякі висновки. Хаотична організація громадського простору через присутність тут ринку, оточеного парковкою, відрізаність від решти середмістя, незручність пішохідних шляхів, які тут інтесивно діють, відсутність озеленення – усе це створює суміш з несприятливих моментів для успішної реновації площі Вічевої. Проте, заховані під землею залишки Низького замку та церкви св. Катерини – створюють дуже позитивне підґрунтя, що може дати гарний поштовх до розвитку площі, саме в аспекті історико-археологічної та культурної спадщини.

Ключові слова: *реновація, площа Вічева, Низький замок, ринок Вернісаж, Львів, спадщина, громадський простір, площа.*

ARCHITECTURAL STUDIES

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HUMAN-FRIENDLY NEW WAY OF SEEING ARCHITECTURE

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Abstract. This article is written in the wake of the first wave of the COVID-19 pandemic to shake the world and stagnant systems. After COVID, nothing would be the same as it used to be. It is what it used to be, and we were hoping for a different turn of events. However, things will not sort themselves out. So let us take a look at what cannot do itself, but must be done in architecture and design in general.

Key words: architecture, urban planning, new directions, pandemic 2020.

Problem statement

The fiercest battles in architecture are always about beauty. Vitruvian on the Architecture of the Ten Books, the question of beauty is raised to the level of art. From now on, beauty will define the notion of architectural harmony and distinguish blandness and ugliness with a thick line from common construction and its forced construction.

Architecture is today a highly involved field of art. New directions in architecture, called after a new "architecture of care" (Tronto J., 1990), "upcycling" (Adrian Kręślik, 2020) or, finally, the well-known concept of "sustainable development".

Sustainable development, sustainable architecture, sustainable design – these are several terms used. One long-known problem of designing that does not burden the natural environment and its organisms are still under discussion.

People included, too. This article is written in the wake of the first wave of the COVID-19 pandemic to shake the world and stagnant systems. Nothing was supposed to be the same again.

Locked in our homes, hidden from the pandemic, we watched dolphins entering Venice on TV and pictures of Milan from 2008 with smog and from 2020 without smog. They looked like pictures from ads for weight loss products before and after putting on weight. Is there any hope that the cumulative actions of the climate strike and the 'Generation Z' rebellion by Greta Thunberg (Zuzanna Kasperczyk, 2020), dramatic appeals of experts from climate summits, states' commitments to reduce CO2 emissions and reduce human impact on rising temperature and water levels together with actions individuals, who are sometimes affected by the consequences of climate dramas, will allow for radical changes in thinking about space, planet, and design?

We are architects. We focus on designing and solving design and aesthetic problems. Now we will also have to take into account the issues that we will describe below.

Objective of the article

After COVID, nothing would be the same as it used to be. It is what it used to be, and we were hoping for a different turn of events. However, things will not sort themselves out. So let us take a look at what cannot do itself, but must be done in architecture and design in general.

Aleksander Krajewski, in an article written for "Autoportrait", with a title that says a lot about the content of the same "Archifrustations, or what an architect can do for the climate", between pouring out design frustrations on the reader, points out in points (with which we agree and some we decided to update or slightly remodel) how to design to save the world from climate destruction.

These demands are:

1. Respect the air,
2. Respect the water,
3. Learn,
4. Reuse, recycle, revitalize
5. Make your building lighter,
6. Forget about coal (at this point the author wrote "COP24 Summit in Katowice. Let us celebrate this event with a minute of silence"),
7. Eliminate the coefficient of the minimum number of parking spaces,
8. Be consistent.

Results and discussions

In our opinion, the topic requires extensive commentary. We would also like to add a little bit of ourselves. Starting all over again.

The author of the counting sheet is an architect, social activist involved in designing on an architectural scale and the scale of public space planning.

The watchwords he discussed in Autographs concerned architectural design on an architect's scale. We would like to include a fairly complete list, add a few requirements for urban design, analyze the possibilities of creating a climate, and open the field for cooperation with specialists in materials science and installation.

1. Respect air, respect water.

The relationship is obvious. Higher temperatures, greater amplitudes, less water, greater water losses, greater energy consumption. Worse climate, more disease, serious consequences for the planet. Water runoff from the area that should be retained, uncontrolled droughts, uncontrolled floods.

So let us start from the very beginning.

Krakow boasts the liquidation of 43.6 thousand boilers and furnaces using solid fuels. The number of days in which the pollution exceeds the already high standards of harmful substances concentration per year is still over 200.

First of all, electricity, as the cleanest source of energy, should be the basis for powering a modern city. People living in urban areas are exposed to a much greater risk of being exposed to the need to function within heat islands than those living in non-urbanized areas. The heat island effect is already widely analyzed in the literature and elaborated on in detail.

Secondly, we should design the city with an opportunity to improve its climate conditions. temperatures are a huge challenge, especially in tropical climates, although a mild climate, like our native one, poses a significant threat to inhabitants suffering from the effects of prolonged, high temperatures.

Several experiments have already been carried out on how the geometry of buildings should or should not look like to produce certain effects like ventilating the city sufficiently, controlling temperature rise, reducing discomfort, etc. Overall, the results of the research suggest that the choice of geometry and diversity of buildings has a huge impact on the final (artificial) climate in the city.

Significant points in discovering the city: outdoor and light cooling as well as energy consumption, objects are noticeable to the naked eye. It is vital to check that traditional types of buildings with different heights and volumes, with a smaller number of floors and their form, have a significant impact on the external and internal conditions of the neighbouring buildings. Modifying the urban geometry and diversity in its assistance allows us to generate a local climate and avoid heat islands.

So let us show you few examples.

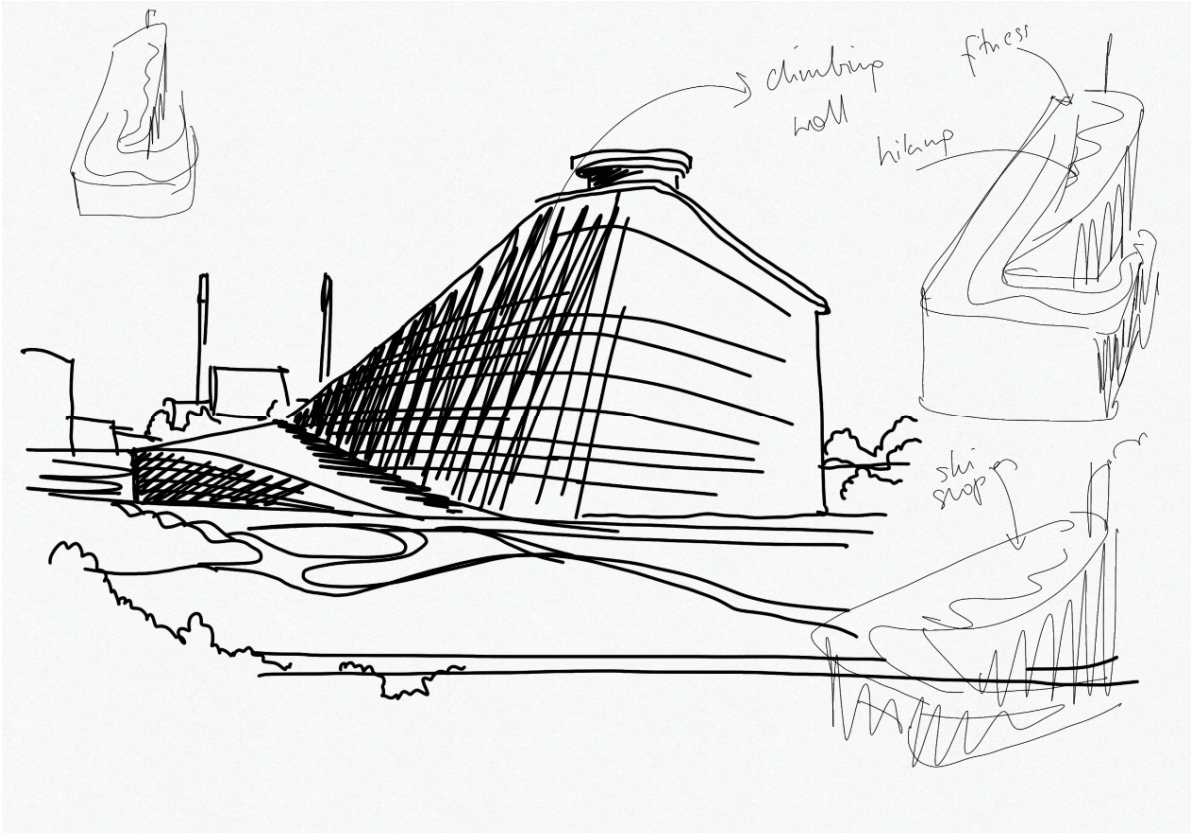

Fig. 1. Copenhill: ski slope, climbing wall and street fitness on BIG's waste-to-energy plant in Copenhagen

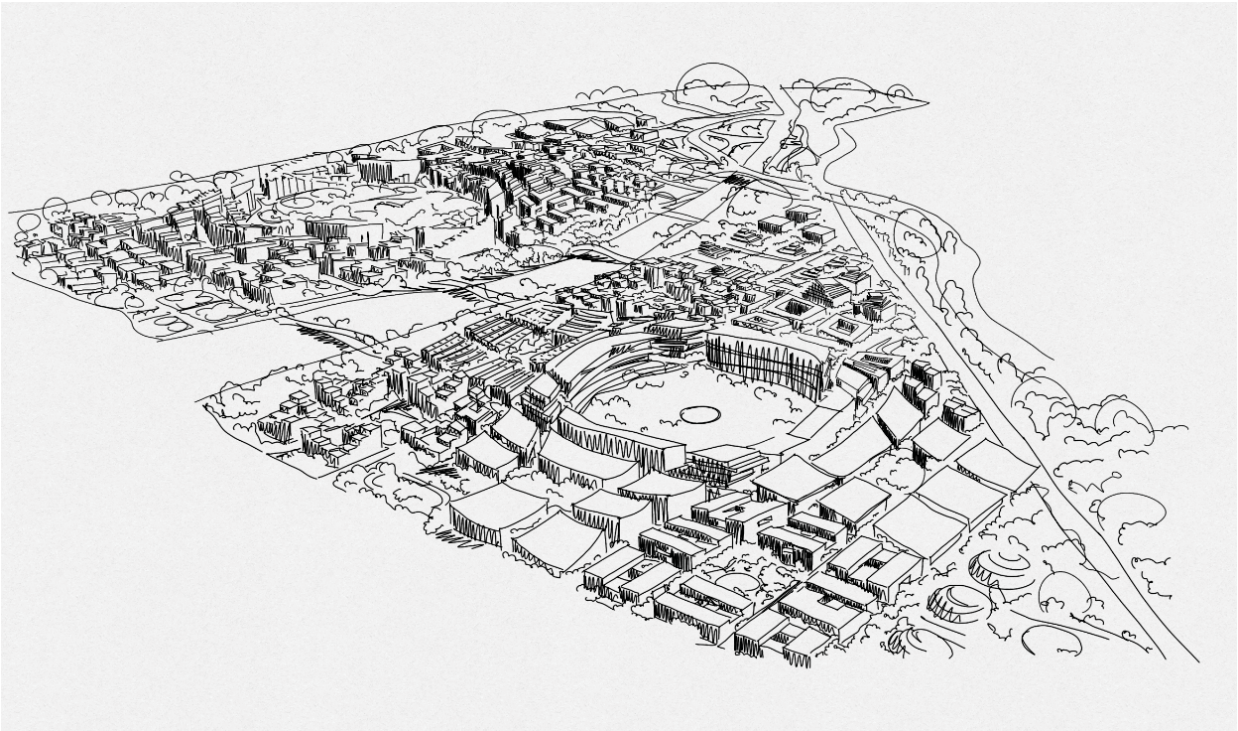

Fig. 2. Toyota Woven City, the World's First Urban Incubator

We should take into account the opportunities offered by the knowledge and skills and the use of technology. It is about materials, their assessments, and designing the use of materials in such a way as to derive the most profitable benefits from the construction process while generating the smallest losses and damages.

2. Future cities.

We are waiting for the repair of the existing world and the revitalization of historical cities in terms of energy. Poland is not chasing Western Europe, but rather dignifiedly stomping, and the concepts of zero-emission architecture are still distant design activities of BIG, such as Copenhill or Woven City.

Somewhere in the western world, urban revitalization is combined with man and nature. Greenery is an integral part of it, and renewable energy is the basis of its functioning. New trends in modern architecture assume the necessity to use such opportunities that do not threaten energy stability. Europe and the commitments signed impose a significant reduction in CO2 emissions. Now we have the motivation and framework for action in the subject of global climate change, so the only thing left for us to think about is designing the cities of the future, or rather redesigning them so that they become still habitable in the future. We must focus on the future and how we should respond to regeneration planning and plans. We need to find a new space for research and discussion. We cannot allow our cities to expand freely horizontally. We have to start thinking about their vertical construction, but taking into account the parameters determined by the necessity to limit the heat islands and the canyon effect.

There is much to think about and do. Architects, as creators, on the one hand, erecting monuments to the power and capitalism, and on the other hand, awarding each other the PRITZKER awards for activities for the benefit of local communities and architecture at the highest possible financial cost and environmental consumption, along with growing the 'Generation Z', concluded that the right to life may soon become a luxury..

3. Learn from the wiser. Learn from other's mistakes and successes..

The opinion we would like to quote from this speech by the President of Rio de Janeiro, Eduardo Paes. There is no city design without the participation of politics, and we would like to comment on it. “Four Commandments for Cities” [9]. This speech is a monologue of a man managing a city with a population of 6 million, whereas 20 % of people are favela residents. Paes advises that you do not have to be wealthy or powerful to make smart changes. We do not agree with his statement, but we agree with the others, for example, the thought to always use smart solutions that have already worked elsewhere. So let us present four opinions of President Paes' speech.

1. The city of the future must be environmentally friendly.
2. The city of the future has to deal with mobility and integration.
3. The city of the future must be socially integrated.
4. The city of the future must use technology to be modern.

The space of the city of the future must be a safe and pleasant living space. Going a step further, in the work of architecture and urban planning, we must take into account not only aesthetic, sociological, and economic aspects, but future-oriented activities, not preventive, but rather pro-development.

4. Reuse, recycle, revitalization

In the long term, revitalization and modernization are better for people and the environment than the use of non-modernized facilities and space (Sonetti G., 2020). Edward Willson writes about unrestrained urbanization, ruthlessly announcing: half of the Earth should remain beyond human reach]. We were ruined by treating the Earth as a source of raw materials (Wilson E. O., 2017).

In our opinion, another notion worth mentioning was introduced into the literature. Well, it is a RESOLUTION.

Resettlement is a concept introduced by a researcher from Cumbria (UK) who has spent years dealing with strategies development for companies, including a strategy for the United Nations. “Deep adaptation” or “resilience” is the process of adaptation to adversity, trauma, tragedy, threat, or high stress such as family and partner crises, serious health threats, or stress related to work and financial situations. It means “recovering from a difficult experience” (Shiva V., 2020). The concept is significant for us (people who need to adapt to the world they live in) and will always be considered on a global scale. The most important thing will be “thinking

about the community of the future" (Katarzyna Szpicmacher, 2020) and recognition of our total dependence and interdependence with nature and the processes that take place in it.

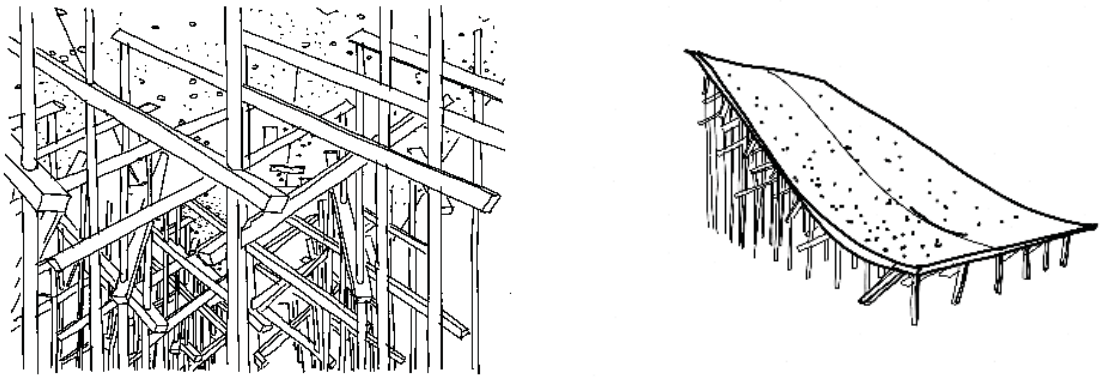

Fig. 3. MYCOsystem by Małgorzata Gurowska, The Polish Pavilion at the 22 International Exposition of La Triennale di Milano

5. Make your building lighter.

Who needs contributing such huge amounts of concrete and forces into a single-family house as for a bunker to fit two adult people, one child and a dog?

Of course, we can think about literally weight loss for building. That is, slimming the structure, reducing weight, load, etc. However, we believe that we should also think on a new approach to design – from the point of view of making a lighter imprint on the surrounding landscape and ecosystem.

Is how we came to the MYKO system. This is an exhibition from the Milan Design Triennial, shown in 2019. The installation consisting of wooden sticks, as we are thinking about it now, is to show the possibility of thinking about architecture differently than before. From the point of the authors' view, its modular, reusable, and inconsistent character should refer to nature. We are usually thinking similar to the idea of the authors of Lego blocks. Here we have wooden toothpicks. The possibility of assembling elements without the need for their permanent assembly seems completely innovative here (Bendell J., 2020).

6. Forget carbon.

In 150 years the known non-renewable energy sources will end. We will die out without them. The reason why we do this starts with the planet we live on – the only habitable planet we know.

As humans, we seriously shake the balance of nature, endangering our future, or at least the future of coming generations. That is why, unlike the generations of planners, architects, and engineers before us, in our work, we have to face and solve three challenges related to sustainable development. The first is climate change: it is already happening, and we cannot stop what our parents and grandparents have caused. So we have to be prepared for extreme weather events. Running out of fossil fuels is a challenge: we may be able to postpone the fossil age of another human life, but it will end anyway. And if we want to avoid extreme climatic events, we must completely switch to clean renewable energy sources. The problem is also the scarcity of other resources: many resources are running out.

Natural causes and geological cycles cannot explain this rapid change. With probability bordering on with certainty (95 %) the IPCC, representing thousands of climatologists, states that exacerbated climate change is caused by greenhouse gases, mainly emitted by human processes. Estimates vary, the existence, temperature on Earth will most likely increase by 1.5 to 5 degrees this century, depending on the action taken or not. All scenarios will have consequences, some very severe. Therefore, climate scientists are calling for urgent action. There is one more reason why we should move away from our current centralized fossil fuel energy system.

It is the most important social reason for energy neutrality. The carbon footprint of all countries in the world is shown on the www.worldmapper.org website (George Crabtree, Elizabeth Kocsc, 2014).

The map shows an obvious conclusion. The Western world becomes responsible not only for the greatest damage to the natural environment and reducing the possibility of life on earth, but is also responsible for its repair and introduction of new standards of contemporary design and thinking about people and the natural environment. The Paris Agreement has been signed by 150 countries. CO_2 emissions must be reduced. Energy sources are entirely transformed into renewable energy sources.

We have got a position on this matter by one of the biggest perpetrators of the climate tragedy (the construction sector), consuming 30 to 40 % of energy. The assumption is that we will be carbon neutral by 2050. To achieve this goal, we must not only learn to design zero-energy buildings but also transform those already existing into energy-neutral.

Better World published a list of the 10 greenest cities in February:

1. Reykjavik – 95 % geothermal energy and 100 % renewable energy.

2. Zurich – 75 % renewable energy.

3. Bristol with a reduction of energy consumption in homes by 16 %, by 2020 reduction of CO_2 emissions by 40 % and by 2050 to 80 %.

4. Portland – 33 % renewable energy, electric bikes and carpooling.

5. San Francisco, as one of the greenest cities, with a high ecological standard of energy use in construction, public transport, etc.

6. Vancouver by the end of 2020 assumes 100 % renewable energy and a comprehensive green city plan: energy, transport, buildings, clean water, and "zero waste".

7. Malmo, assuming that the entire city will use energy from renewable sources by 2030. Appropriate spatial planning, reduction of gas emissions, transport optimization.

8. Copenhagen: aims to be carbon-free by 2025 and cut emissions by 50 % from 1995.

9. Stockholm: 1,000 parks and 12,000 trees in the city centre, commitment to being fossil-free by 2050. 95 % of the inhabitants live 300m or less from the greenery.

10. Oslo has the lowest CO_2 production in Europe, awarded as a sustainable European city in 2003, and titled the greenest and friendliest city in the world.

Now we came to the bottom of what we would like to write about and what to focus on.

Western universities are introducing zero-emission design courses for students, even available on remote education platforms. In Poland, however, this practice is still treated as a fashion fad. We design buildings that are more economical but in the production process. We count PUM, earn money on the construction site per square meter of an apartment, trying to make a concrete cheaper, regulate rivers, destroy the ecosystem. In cities such as Krakow, where a large part of the city fights for the right to green life, creating grassroots greenery conservation movements and associating students of architecture departments in organizations such as "more concrete in Ruczaj" (Ruczaj is the name of the estate), you can already feel what we should take for the norm. When a city is the owner of the land, not only a control body, it has a greater influence on planning activities, it can set conditions, requirements and regain control over the implementation of buildings based on city development plans. We are now returning to the considerations on the necessity to divide or consolidate land, which is of social importance in the times of climate and ecological crisis. Leaving the aspect of caring for the environment and the awareness of such a necessity to the city authorities would be naive and a continuation of the fatal practice. "You have to fight for the right in democracy" an interview with Joanna Kusiak, in which she states that "Urban planning monopoly" in Sweden (Stockholm owns 70 % of the land within its borders) without taking into account the will of the developer or a private owner can introduce top-down rules leading to sustainable city development.

Meanwhile, in Poland, Paweł Hałat writes: "Although the interdependence of space, economy, and society seems obvious, one of the greatest deficits in development planning has been for years the lack of linking spatial policy with the so-called socio-economic planning (which includes strategies). Strategies of

territorial units are created independently of development plans, at different intervals, based on separate diagnoses, procedures, and consultations. These documents, full of formulas about sustainable, intelligent, compact, low-carbon development and increasing the quality of life, thus become a collection of wishful thinking in the face of sprawling buildings and the growing number of cars. Similarly, projects included in development strategies – without specifying the place of their implementation – become only a paper record, and big words about metropolitan ambitions pale in the face of the chaotic space around strategic urban investments". This is how Hałat writes about the Krakow Tauron Arena.

Let us look at the Scandinavian and German patterns. The issue of sustainable development and the introduction of solutions that work in practice is implemented much better there than in Poland. On May 14, 2020, the Ministry of Climate presented the Committee for European Affairs with a plan to reform the electricity market. The plan covers topics such as balancing market, Demand Side Response (retail market, grid expansion, reduction of allocation, and cross-border connections). The subject is long and we would not necessarily want to focus on it. We can easily assume that of all the possibilities of using renewable energy, we choose the solar one, also produced locally. Looking at Germany, which is the undisputed winner in the European competition for energy solarization, we conclude: more ambitious spatial planning involves taking into account minimum energy goals while minimizing CO_2 emissions (Trias Enrgetica process and industry collaboration). Energy is the one that we do not use, so it is necessary:

- to reduce gross energy demand;
- to cover the demand with sustainable energy from renewable sources;
- if this is not possible, to optimize the use of fossil fuels (Olaf Bruun Jorgensen, 2018).

To ensure the design and functional consistency, it is possible to apply IED, i.e. Integrated Energy Demand, adjusting the building design: its orientation, location, functions, and shape to the surroundings and its parameters. Thanks to this process, we can afford the optimal use of the investment space, minimize the energy demand and the use of sun and daylight. The use of 3D modelling plugins (UrbanSOLve) allows you to quickly estimate the passive and active potential of the sun and create well-thought-out design alternatives at the initial stage of investment planning. We mentioned earlier about the revitalization process and the fact that urban areas are characterized by a strong influence on the energy of neighbouring buildings. The positive or negative impact they generate will have far-reaching energy, economic, and climate consequences. However, we must briefly point out, because the topic is inexhaustible, about the need to introduce a new standard for the use of prosumer energy. The concept of prosumer energy functions in the legislation, and we should take into account the necessity of such a sustainable design that takes into account the need to produce distributed energy and its use as a better replacement for the currently used central one based on coal. Architectural design should take into account the carbon footprint, the economic aspect of the design and construction of the facility (or facilities), and take into account the need to use integrated energy production systems with the structural and facade elements of the building. Instead of thinking about energy as an additive, it's time to think about design comprehensively.

7. Reducing the number of parking spaces

How to create an apartment-friendly space? Not necessarily building an unlimited number of parking spaces. The number of passenger cars used by city dwellers exceeds the capacity of car parks. The city, as a space created for residents to live, consists largely of asphalted roads for cars and parking lots.

Electric scooters, bicycles, and short-term rental cars are investments that are much more attractive from the financial and ecological point of view. Also when it comes to landscaping. The city must take this into account when limiting the concreting of the ground. Space must be habitable. It's called a "liveable city". Lectures are already being conducted on the edX educational platform. What to consider when designing a new city? How to think about the city's growth while limiting its growth? During the lectures on "Cities Suitable for Living", these aspects of life and factors are disclosed:

– possibility of earning money is taken into account, i.e. the economic aspect – so important and conditioning to be or not to be in the urban space;

– attractions that space offers;

– the ability to function comfortably in a breathable, clean environment that does not cause serious diseases and premature death.

Let us start with urbanized space. If we were to analyze the development of the urban organism itself and how it came about that most of us live, and despite the COVID pandemic and technological possibilities that were to replace traditional face to face models, people still need contact with other people. We will not cite literature from the canon of school reading about epidemics and the need for contact with people now, but we would like to mention the book "Delirious New York" by Koolhaas because the association of this book is of little value when it comes to the aspect of the theory of space construction (because it deals with their extremely distorted mutations) will be most appropriate here. The city of New York and its history is described as laboratory modernity and a space-sociological-entertainment experiment. In addition to the history of the mathematical accuracy of the road mapping and rapid expansion periods, we are reminded by the description of the surreal world in entertainment from – ATTENTION! – artificial lights, with which you could also take a bath in the river at night. New York is becoming the entertainment capital for residents and caricatured makes artificial what was needed in the 17th, 18th, and 19th centuries for the inhabitants of the New World. Artificiality was what attracted the villager to the city.

A city dweller needs work, entertainment space, attractive space, very competitive in analyzing green fields and forests. Workshop competitions can make money or lantern. Modernity as a synonym of attractiveness will always be a catalyst (Rem Koolhaas, 1997). One can, of course, go further and condemn the state of using the possibilities of a technological step by cities for their natural character. Drawback some land in the middle of the city itself to Earth. Nowadays, modernity is a return to nature. Reusable thermos cups instead of polystyrene, but still concrete, fenced housing estates – instead of wooden huts with rainwater tanks.

What can you do for good examples of already implemented projects?

Bring wetlands to the use of plants and worms, thus create natural retention spaces (London, Queen Elizabeth Olympic Park), green river banks (Sutcliffe Park) and geometricize smooth, concrete descents into the water (Kasper Jakubowski, Sztuka Przetrwania, 1997). Can be made renewable to cities. Revitalize buildings that generate large energy losses. To hand over some of the built-up areas in the city centre to the management of greenery.

In our Polish area of a moderately prosperous Central European country with a moderate climate (although it causes a continental climate to a greater extent), we should focus on the maximum division of dispersed energy sources (solar).

Conclusions

The process of urban planning is very complex, just like architectural design, but today we are talking about a different scale of the design. Our main goal is sustainable design, good neighbourhood, and optimal use of energy and opportunities offered by technological progress. Planners, town planners, and architects have to deal with many aspects simultaneously. In Germany (the country we are taking as a model), planning is carried out in strongly overlapping phases and approaches this process interdisciplinary. Assessing the situation, detecting a problem, setting goals, determining the scope of planning, the planning itself, the implementation phase, and monitoring and evaluation of the plan implementation are subject to consultations not only from the industry but also from the public. Thanks to the morphological analysis, urban planning allows for the optimized use of wind energy and sunlight. A good city plan or a revitalization plan introduced in terms of energy optimization will affect the air temperature, limiting the canyon effect, the health of its inhabitants, and the comfort of functioning in it. "The best energy is the energy that we don't use" (Giulii Sonetti, 2019).

The approach to design changes with the introduction of modern planning methods and the available tools, knowledge, and awareness of experts who design space – an interdisciplinary approach, professional responsibility, and design ethics interpenetrate like never before, creating modern models of trying to save the stagnant world.

The demands of the generation with great awareness of the climate threat, the generation facing the destruction and degradation, become the basis of sustainable design ideas and must set the direction of our view.

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ДЛЯ ЛЮДЕЙ – НОВИЙ СПОСІБ БАЧИТИ АРХІТЕКТУРУ

Анотація: *Ця стаття написана після першої хвилі пандемії COVID-19, яка приголомшила світ та застарілі системи. Після COVID ніщо не було б таким, як було раніше, однак потрібно зрозуміти, що саме потребує змін. У ній проаналізовано, що світ змінитися сам не зможе, пропонується як повинен далі працювати архітектор та дизайнер, а також визначено основні напрямки розвитку містобудування.*

Процес містобудування дуже складний, як і архітектурне проектування, але сьогодні ми говоримо про інший масштаб проекту. Головна мета дослідження – це аналіз стійкого дизайну, добросусідські умови та оптимальне використання енергії та можливостей, які пропонує технологічний прогрес. Планувальникам, містобудівникам та архітекторам доводиться мати справу з багатьма аспектами одночасно. У Німеччині (яку ми досі приймаємо за модель) планування здійснюється на фазах, що дуже перетинаються, і підходять до цього процесу міждисциплінарно. Оцінка ситуації, виявлення проблеми, встановлення цілей, визначення обсягу планування, самого планування, фази реалізації, а також моніторинг та оцінка виконання плану підлягають консультаціям не тільки з боку галузі, а й з боку громадськості. Завдяки морфологічному аналізу, містобудування дозволяє оптимізовано використовувати енергію вітру та сонячного світла. Хороший план міста або план ревіталізації, введений з погляду енергетичної оптимізації, вплине на температуру повітря, обмежуючи ефект каньйону, здоров'я його мешканців та комфорт функціонування в ньому. Підхід до проектування змінюється з впровадженням сучасних методів планування та існуючих інструментів, знань та обізнаності експертів, які проектують простір. Міждисциплінарний підхід, професійна відповідальність та етика дизайну взаємопроникають як ніколи раніше, створюючи сучасні моделі спроб врятувати застійний світ.

Вимоги покоління, яке добре усвідомлює кліматичну загрозу, покоління, яке стикається з руйнуванням та деградацією, стають основою стійких дизайнерських ідей і повинні визначити напрямок, у якому ми будемо шукати.

Ключові слова: *архітектура, містобудування, нові напрямки, пандемія 2020.*

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Andrew Nasturzio[1], Alessia Urbani[2]

THEATRE COSTUME AS A FACTOR OF ARCHITECTONICS OF THEATRE SPACE (COSTUME DESIGN FOR *THE PENELOPIAD*)

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Abstract. The costume design by Andrew Nasturzio and Alessia Urbani for The Penelopiad at the Ryerson Theatre brought an innovative, creative and a unique design approach by embracing the challenges of the production.

Key words: costume design, designer, quick change, theatre.

Problem statement

The IV Transatlantic Seminar on Theatre Arts was hosted by the Prague Quadrennial of Theatre Design and Space-19, the World's leading theatre exhibition, in Prague, Czech Republic, 6–16 Jun 2019. The seminar was a joint event of the Department of Design of Architectural Environment, Institute of Architecture on Lviv Polytechnic University, Ukraine, and the School of Performance, Ryerson University, Toronto, Ontario, Canada. During the seminar, 10 papers were delivered; the presentations centred on theatre architecture, scenography, and space for performance in historical buildings as well as outdoor venues in Ukraine, Canada and Georgia. Andrew Nasturzio and Alessia Urbani presented on the process of creation of their costume co-design for *The Penelopiad* by Margaret Atwood inspired by the classical poem, *The Odyssey*, produced by Ryerson University's School of Performance in October 2018 (directed by Dragana Varajic. Set Design by Pavlo Bosyy, Costume Design by Andrew Nasturzio and Alessia Urbani, Lighting Design by Amelia McCarthy Blaine, Projection Design by Anson Wong.

Objective of the article

The paper's objective is to present the role of theatre costumes for *The Penelopiad* as a factor of the creation of the theatre space.

Results and discussions

The Penelopiad by Margaret Atwood is a retelling of the classic tale of *The Odyssey* told through the eyes and events of Penelope and her twelve maids who all reside in Hades after the events of Odysseus' return. *The Penelopiad* directed by Dragana Varagic had its Ryerson Theatre debut in October 2018 (Fig. 1).

Fig. 1. A scene from *The Penelopiad,* Ryerson Theatre (Photo by Pavlo Bosyy)

The Penelopiad featured an ensemble of women who played multiple characters who never exited the playing space. A major motivating theme for the design was ambiguity. This production was set in a

time that was here, and there and nowhere all at once. The space of the show was intended to appear timeless and endless. (Fig. 2).

Fig. 2. Scenes from *The Penelopiad,* Ryerson Theatre (Photos by Pavlo Bosyy)

As well as then and now and never. The veil of time and space merged into an ambiguous place where we took inspiration and nods from Ancient Civilizations and avant-garde fashion to create a costume design that was symbolic, transformative and fashionable. The design for this ensemble of women was to treat them as individuals who look unified with one another. This was done by ensuring that a consistent colour palette was used for the ensemble and having unifying elements for each actress. The ensemble had a neutral colour palette that reflected various skin tones, representing the flesh of these women that were unjustly punished and murdered. All the maids had leather cuffs to show that they were shackled and slaved as maids. Additionally, this also lent itself to the idea that the women were unified in strength. The maids in our production of *The*

Penelopiad were strong, fierce women and their costumes need to show that, which motivated the choice of their footwear – ankle boots. We wanted a strong shoe that carried power and that was the boot. The ensemble of the maids was juxtaposed by Penelope who was costumed in a white and black gown. The white and black represented how Penelope was the executioner and the victim and the veil of the living and the dead was merging into a place of ambiguity. Penelope's costume was as simple, bold, and ambiguous as the stage; the latter did not feature any forestage, upstage, and side spaces, the orchestra pit was covered by the specially created steeply raked small seating area for less than 100 audience members – that way the 1200-seat auditorium was transformed into a small and incredibly intimate space. This gown was used to show the double imagery which was crucial to our production (Fig. 3).

Fig. 3. Costume sketches for *The Penelopiad*

The double imagery was a motivating theme throughout the design as each actress had two or more characters they needed to become throughout the story. Their costumes had to be transformable in a quick second on stage so that they could become a completely new character without affecting the flow of the production. In other words, the performers should not disappear from the stage at any moment of the show for the costume change or whatsoever. This posed an interesting challenge, having to create costumes that could perform quick changes between two characters that were simple enough for the actresses to perform and effective enough that the audience would understand the change in character. The solution was magnets. By using magnets, the costumes were rigged in a certain way that could allow pieces of fabric to fall and reveal other garments. For example, skirts were pinned back to reveal pants and toga-like tops were unhooked to become a skirt that revealed a bandeau that was underneath. The challenge of the onstage quick changes fueled an original design where creativity was the focus which resulted in an exciting and unique costume design for this production of *The Penelopiad.* Along with the other minimalistic space-scenographic solutions.

Conclusion

The original costume design by Andrew Nasturzio and Alessia Urbani was instrumental for keeping the dynamics of the uninterrupted flow of production as well as helped to integrate the scenic action and space harmoniously.

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ТЕАТРАЛЬНИЙ КОСТЮМ ЯК ФАКТОР АРХІТЕКТОНІКИ СЦЕНІЧНОГО ПРОСТОРУ. (НА ПРИКЛАДІ ДИЗАЙНУ КОСТЮМІВ ДО ВИСТАВИ “ПЕНЕЛОПІАДА”)

Анотація. *Дизайн костюмів Ендрю Настурціо та Алессі Урбані в театрі університету Райєрсона вніс інноваційний, креативний та унікальний підхід в побудову дії вистави та архітектури сценічного простору, де саме театральні костюми у виставі “Пенелопіада” стали фактором їх творення.*

Вистава випускного класу Школи виконавських мистецтв Університету ім. Е. Райєрсона “Пенелопіада” відомої сучасної канадської авторки Маргарет Етвуд поставлено на великій сцені школи (її зала налічувала 1200 місць) у 2018 році. Для вистави цей простір був змінений на камерний, де сто глядачів розміщувалося над оркестровою ямою, на спеціально збудованих трибунах, практично в самому просторі дії. Сам простір сценічної дії за задумом не мав мати ні початку, ні кінця як в просторі, так і в часі. Актори не мали зникати під час вистави для перевдягання у просторі сцени за лаштунками, завісами, палетами. При мінімумі інших сценографічно-світлових, просторових, декораційних рішень саме костюмам, рішення яких полягало у використанні магнітів, що утримували, а за потребою, могли падати на планшет і розкривати інший сценічний одяг, вдалося підтримувати постійну динаміку театральної дії без перерв і змін. Сприяти гармонійному синтезу середовища дії і простору сцени.

Ключові слова: *дизайнер, дизайн костюму, швидка зміна, театр, сценічний простір.*

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ASPECTS OF THE FORMATION OF A GENDER-SENSITIVE URBAN ENVIRONMENT OF RESIDENTIAL STRUCTURES

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Abstract. The article considers aspects of the perception of space from the standpoint of gender, and their impact on the formation of a quality living environment. The results of a sociological study are presented, which indicate the existence of differences in the requirements for the formation of the urban environment of housing and the assessment of its qualities by men and women.

Key words: living environment, gender, sex, gender pattern of behavior.

Problem statement

The realities of the modern city encourage discussions about the humanized housing environment of the information age society. The space of the city serves primarily to establish social connections, the possibility of self-establishment of the individual, and as a result of these necessary needs, to provide an opportunity for comfortable movement in its often complex planning organization.

It is often believed that architecture is created for a person as an impersonal average being. However, each consumer has different needs, different behaviours, and a different perception of the environment in which they are located – this encourages us to consider the problems of self-identification of a person in a city and a dense living environment. The system of values and requirements for the housing environment differs, as studies of many researchers show, depending on the gender scheme of individual behaviour (Rendel, 2000)

Analysis of recent research and publications

In architecture, there are scientific works devoted to research on gender, written by H. Fasenko, O. P. Oliynyk, D. Pankratova. However, the research is aimed more at finding gender symbolism in the image of the city than at studying the processes that cause the appearance of this associative symbolism in the urban environment.

Significant orks in the study of the living environment through the prism of gender psychology belong to Louise Durning, Jan Rendel, and Barabari Penner (Rendel, Penner, Borden, 2000). Foreign researchers show an active interest in understanding the gender presence in architecture, determine the specific parameters of the

living conditions of women and men (U. Bauer). To create a critical mass of research, the European Network "Gender, Diversity and Sustainable Urban Development" (GDUS) was created, which offers a critical attitude to the andro-centric reflection of the urban space and outlines gender-sensitive spaces. In the research of the term "gender", we refer directly to Sandra Boehm's paradigm – the theory of the gender scheme[1].

In the work of I. Altman, we find the methodological foundation of the problem of spatial gender-coloured behaviour (Altman, 1975). One of the most important texts on this topic is "What would a non-sexist city look like?" Dolores Hayden. Although the text was written in 1980 and deals mainly with trends in the development of American suburbs, which reflected the centre of family life away from "men's jobs", it still largely remains relevant.

American researcher S. Low (S. Low, 2003) uses the concept of embodied space and emphasizes that "using objects, a person forms an experience and turns it into symbols, and then the symbols return to the experience again" (Fesenko, 2014). Therefore, on the issues of "arrangement" of living space arise such as "architecture of happiness" (A. Botton) (Botton, 2013).

Architecture heory has raised the problem of gender features in architecture through the separation of "female" (woman's building) and "male" (men's building) (Pepchinski, 2000).

Objective of the article

The research aims to study aspects of the influence of gender characteristics of urban residents on the formation of the spatial planning structure and architectural organization of the urban environment and apartment residential formations. It seems appropriate to find out the dependence of the main requirements, mechanisms and features of the formation of the housing environment, taking into account gender issues.

Results and discussions

Conditions of the modern city and its trends. Different lifestyles of city residents create different needs and requirements for urban space, the residential environment in general, and the residential unit in particular. To determine these needs and requirements, a detailed analysis of the composition of society, categories of active consumers and real home buyers is necessary. The cross-section of the population of Ukraine by gender and age groups shows that the majority of consumers are the age category of 30–55 years, a fairly wide range, taking into account different conditions for the formation of personalities, political and ideological including, which has a significant impact on the requirements for the housing environment and the degree of their interaction with the urban environment. The existing urban housing environment may or may not meet the needs of a certain category[2] of consumers. Also, among gender and age groups, there is a division into social groups of the population with more detailed descriptions and explanations of their behavioural patterns by gender, but the main trends can be traced even at the first level.

For example, Generation Z [3] as he main promising group of users of the architectural environment, whose number according to the newspaper Estadão, in May 2016 was 2 billion, and by 2023 it is expected that they will become "the largest working group in the world", is characterized by different philosophy of life, ways of perception and use of the environment than for the population born before 1990 (Pereira, 2018).

There are noticeable statistics of an increase in the average age of marriage, young people are more focused on personal development and an active lifestyle that is subject to rapid changes. This is also evidenced

[1] The theory, based on the concept of behaviour patterns, considers the characteristics of gender identity of individuals as the basis for their way of organizing information about the world around them.

[2] This study does not take into account the division of consumers by solvency.

[3] Generation Z is a group of people born in the period 1990–2010. They are also called the internet generation, Generation 9/11, Net Generation, and demographers call 1991 the year of birth of the generation (the creation of the internet), others think it is 2001 (its introduction into everyday life), in Eastern Europe, the starting point for the life of a new generation, consider the end of the Cold War and the final collapse of the USSR. Authors, American historians V. Strauss, N. Hove, through the prism of US history, have noticed repeated cycles of common human behaviour patterns every 100 years and changes every 20 years to a new one. Such a countdown in modern history begins with the post-war years, as an understanding of the difference and a certain definition of common characteristics inherent in a certain generation and the prevailing trends that existed then.

by the growing trend of young people's desire to rent housing, since buying it entails, in addition to more costs, also "linking" to one place of residence and activity. Thus, many real estate companies with the prospect of 10 years more invest in so-called "pop apartments", apartments for tenants. Generation Z is also characterized by the assignment of places, namely public spaces. The priority is no longer "a castle house for the whole family until death does you part", but communication and discoveries are important. Unlike Generation X and Y,[4] Generation Z promotes independence and nomadic style, shows undisguised interest in the ideas of introducing an increasing number of cohousing communities and minimal living space. The urban environment is their living environment for them.

That is why urban initiatives such as the Paulist Aber movement have become popular, attracting the attention of urban planners from all over the world, with the desire to restrict car traffic on weekends and holidays, to create more collective space and the possibility of cultural and artistic manifestation of residents' initiatives. Trends in attracting citizens to the ideological content, creation and implementation of urban and intra-block spaces are becoming increasingly relevant, which contributes to the psychological relationship of residents with the architectural environment.

Of course, a significant part of the urban population is also made up of a different layer of users (X and Y), for whom, for various reasons, a more conservative lifestyle and, accordingly, housing requirements will be a priority, with an emphasis on privacy, security, and family guidelines.

Having a wide range of urban consumers means that there is a need to diversify offers in the housing market to meet the demand for a wide variety of tastes. Ensuring an informed response to demand requires a focus on gender-sensitive design. The gender-sensitive environment is a new hybrid urban environment of housing entities that promote the social, economic and environmental development of residents, and offers high-quality residential buildings in urban settings.

The mechanisms of gender creation and its behavioural patterns are extremely important for understanding its impact on the formation of a comfortable urban living environment.

Gender means the social and psychological gender of an individual as a reflection of the socio-cultural nature of a person, which is based on gender identity[5] and gender role. To determine gender identity, it is assumed that a certain list of characteristics of an individual corresponds to the gender role of the individual described in society. Thus, a person who identifies himself independently as a "typical man" or "typical woman" and tries to meet certain social standards of these concepts may have such a set of personality characteristics that the level of indicators of masculinity and femininity correspond to an inversion of gender identity – isomerism (Voropaeva, 2011) or an androgynous type of identity. That is, a female person who carries the socio-cultural image of a woman may have personal characteristics inherent in a "typically masculine" gender identity -this is an isomeric type of identity. A person who has an almost equally high level of indicators of masculinity and femininity of the individual is defined as androgynous (Voropaeva, 2011).

An interesting fact is that if a woman has an isomeric type of identity – masculine, but lives according to the gender attitudes of society, then she will most likely perceive household management, raising children and preferences of certain characteristics of the housing environment according to traditional methods, because as a person who is gender conformal and non-transgender, will accept and apply the appropriate gender roles of society. However, it is likely that in addition to carrying out biological duties (such as the birth and upbringing of children), she will apply such social behaviour schemes that are characteristic exclusively of masculine individuals, therefore, the preferences of certain requirements for the characteristics of the environment should also coincide with typically masculine gender schemes.

In most cultures, differences between men and women are a factor that has a significant impact on the organization of many aspects of everyday life. Boys and girls are expected to not only master skills and

[4] Generation X – "Baby Boomers" (the 1950s – 1960s) is characterized by the desire for professional success in the early period of life, the desire for life achievements in the name of the "state", a strong family and their housing until "the last days". Generation Y or millennials (parents of Generation Z (the 1970s – 1990s), are pioneers of independence and technologies that make it possible to somehow simplify the implementation of physical actions in the household, communicate at a longer distance, and they took the first steps towards "digitizing" life.

[5] Gender identity is how a person is aware of their own belonging to a certain gender, that is, by their self-perception, and as a result of further unconscious imitation of the social attitude and stereotypes regarding the norms of the image of a "man" or "woman" in society and culture [Hornostay, 2004].

behaviours appropriate to their gender roles but also form perceptions of the environment and characteristic behaviours typical of their gender according to how they are defined within a given culture. Sandra Boehm suggested that in addition to teaching specific concepts and behaviours associated in a given culture with ideas about men or women, the child is also taught to perceive and organize information, the environment according to gender schemes – mental structures that organize the perceptual and conceptual world of an individual according to gender categories (male-female, masculine-feminine) (Bendas, 2006). According to Boehm theory, individuals who have experienced the influence of sexual typing use gender behavioural patterns to a greater extent than individuals who are not exposed to this cultural process (androgynous) (Hornostay, 2004).

This work, in addition to analyzing scientific works in the field of space perception from the point of view of gender, is also based on a sociological study conducted by the author among housing consumers (Pidlisetska, 2019).

The study showed that the requirements for the functional and spatial organization of the environment depend to a greater extent on the gender scheme of a person's behaviour. This creates a demand for expanding the range of influence of individuals on the urban environment of residential formations, which would satisfy different consumers. It is established that for aspects of the formation of the housing environment, it is more important to take into account gender patterns of behaviour and take into account the specifics of the activities of gender groups.

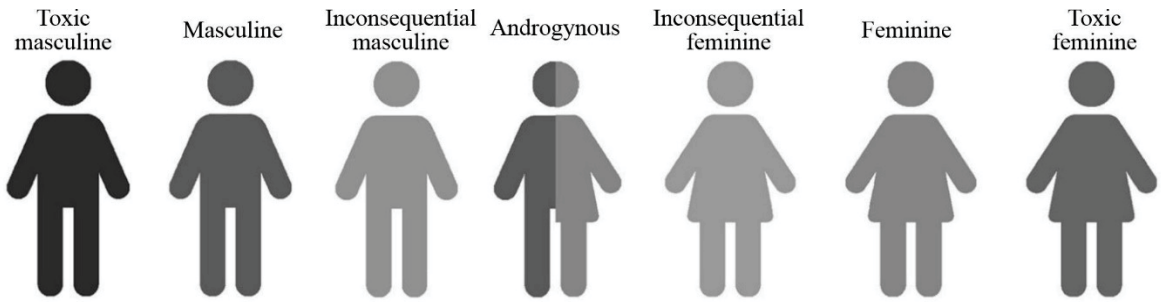

Fig. 2. Types of gender identity by determining the level of indicators of femininity and masculinity

The sociological survey was conducted in 2 stages, the first of which covered more than 600 respondents. The results showed differences in respondents' responses by gender. At Stage 2, a questionnaire was developed aimed primarily at determining the respondent's gender identity for further construction of tables of preferences and schemes of possible scenarios of their social behaviour in the residential environment. The survey was conducted through a personal interview, as well as an online survey. More than 100 respondents are covered. The developed questionnaire provided for several blocks of questions under the task set, aimed at finding out the shortcomings of the existing housing environment; the priority of the characteristics of the residential environment at the level of housing, house, out-of-apartment and urban environment; hypothetical improvements and main criteria when choosing new housing; the method of householding.

A difference in gender perception was also observed in responses regarding the desired type of residential development. If the opinion about the comfort of building 1-3 storey buildings was generally perceived equally, then the difference in the predominant number of storeys of residential buildings is more drastic: the housing of medium storeys (up to 5 floors) is considered desirable by about 40 % of women and 2.7 % of men, while 9 or more storeys are considered preferred by only 8.2 % of women, and men – as much as 50.3 %. (Pidlisetska, Hhat, 2019) In this case, we can talk about confirming the theory of masculine and feminine urban spaces, which was widely described by Aaron Betsky and other researchers (Betsky, 1997; Beatriz, 1992).

This theory is based on giving certain characteristics of urban spaces, the colour of femininity or masculinity. In general, today the urbanized environment, and to the greatest extent modern metropolises, are considered filled with toxic masculinity, characterized by the development of trendy high-rising buildings with relatively narrow streets, a small amount of allocated territory for recreation and other green areas, the rhythm in the compositional solution of the architecture of buildings and the urban environment, a high level of motorization, etc. Women's buildings are considered to be buildings of medium storeys and below, the

allocation of a large area of the city's territory for green areas, spaces free from "commercial offers", the use of natural terrain against the background of the city, and the pedestrian environment (Oliynyk, 2017). It is quite natural to understand the desire of women to fill urban space with small and medium-sized buildings, which entails designing an environment that corresponds to the feminine nature of the urban background. Conversely, the choice of men in favour of high-rise buildings is logically explained by the belief that this type of urban space will bring activity, expectations of "money", create a field for career achievements and victories, and satisfy their male "ego". And is it comfortable for the psychological state of an individual, without taking into account belonging to a certain gender, or not? (Pidlisetska, 2019).

Thus, by studying the gender behavioural patterns of consumers, we can make the urban and residential environment more humanized, more comfortable and safer, easier to respond to demand and predict further trends in architecture.

Mechanism of forming a relationship with the environment. Problems of the interrelation of gender schemes of human behaviour with the environment. Space is a multi-valued and multi-directional capacity for material and spiritual existence and human activity, which, in contrast to the homogeneous and isotopic philosophical space, is effectively and subjectively defined (Democritus, I. Newton). The human environment is not only the natural environment but also the architectural environment (an artificially created environment of life, divided into several levels according to the size and form of interaction with it – a city, district, block, street, yard, house and residential unit). The spatial and environmental problem began to be studied in the late 60s of the twentieth century with the behaviourism of R. Barker. He developed the concept of "places of behaviour", according to which the researcher identified the main characteristics of the space of human activity: situative activity, spatiotemporal localization, and isolation of internal and external processes of human activity (Skrebets, 2014).

According to the criterion of interaction with an individual, the concept of the environment is divided into the following types:

– an individual's existence factor is one that has an impact on a person, without the possibility of human influence on the environment itself. It is uncontrolled by a person, changes the organization of a person's lifestyle, forcing him/her to adapt to new conditions;

– the the condition of an individual's existence is a set of factors that can be controlled, but with a low level of possibility of influence, or are not controlled at all. We perceive it as a given condition of existence, to which we actively adapt. For example, road infrastructure, public space, or the courtyard of an apartment building, as well as difficult natural conditions (difficult terrain, swampy or arid place, etc.);

– a means of subsistence is an environment where an individual can manage and develop it, arrange it at his discretion. That is, if efforts are made to manage this environment, it will develop, for example, own housing, own land plot, the interior of the room. Under these environmental conditions, a person can master it and form ways to manage it;

– as a material of existence, it is the material environment of a person, which is used by him/her to meet his/her own needs (household items, clothing, natural resources, etc.). It is completely human-controlled and available for intervention;

– Besides, the environment is divided by the organization level:

– material microenvironment is the ability to potentially (if you have the means and skills) transform its factors or components by an individual or a small group of people, for example, to change them into the interior solution of an apartment;

– meso-environment – located at the level of environmental organization, large official groups are really or capable of making changes, but in modern conditions of public activity, changes at this level can be made from small groups or an individual. Its objects are streets, neighbourhoods, squares, micro-districts, large enterprises, and natural landscapes controlled by specially created groups. The biggest problem at this level is considered to be the problem of public areas that are actively used by groups of people, but they are not responsible for their condition or management. The psychology of organizing urban public areas has only just begun to conduct scientific research in this direction;

– macro-level – natural and geographical components that can only be managed by government agencies, international organizations, etc.

Under these conditions, the spatial environment of residential formations is explained as a set of real or imaginary reproducible properties and relationships of the living environment, which provides certain opportunities to meet human needs in spatial perception, spatial actions and behaviour. Environmental psychology explains the living environment as the whole set of natural and social conditions in which a person lives (N. F. Reimers). Hence, we distinguish the concept of a residential environment, which is part firstly of our living environment as a place where a person directly lives, secondly as a part of the spatial environment, as a place that provides opportunities for activity, and thirdly, the architectural environment, as a place created under the influence of man. That is, in the residential environment, a person forms a relatively stable form of life activity organization, which subsequently form a holistic way of life of the individual or the corresponding social group.

The conditions of the urban environment have a direct impact on the organization of an individual's life activity, and the formation of a person's lifestyle. That is, for each type of environment of the residential environment, a person forms a relatively stable form of life activity organization, which subsequently form a holistic way of life of the individual or the corresponding social group.

An important derivative component of the living environment system is considered to be the sphere of interpersonal relations of a person with society as a manifestation of an artificial system that is built on the initially formed naturally necessary communication processes, that is, gender relations.

To identify the psychological manifestations of gender behaviour patterns in the spatial environment, we learn that human actions in the spatial environment are divided into:

– unconscious: distance, orientation, personal space;

– conscious (purposeful): territoriality and personalization.

Territoriality means "a phenomenon when a person fixes a certain space, determines the norms of behaviour in it, exercises control over it" (Kovaliov, 1996), and provides for the regulation of boundaries between the individual and society and includes the concept of personalization. According to the degree of fixity, territoriality is divided into:

– fixed space – human behaviour is defined;

– semi-fixed – a person has certain freedom;

– non-fixed – a space in which an individual achieves maximum freedom in choosing their actions.

Personalization of the environment is an individual structurization of it by a person, which does not exclude the interaction of an individual with other people. The inability to personalize the environment causes feelings of alienation, insecurity, and uncertainty. When personalizing the environment, a person determines his/her individuality, an individual identifies the space around his/her living environment with his/her personality and gives a part of the space a subjective essence. With the help of the phenomenon of personalization, we can self-identify a person with the place of our life and the living environment. In addition to transition the influence of the environment of residential formations on individuals, they should also influence it. When trying to combine the concepts of gender and the living environment, we are faced with the following problem of their relationship under the level of personalization of the actual environment in which the individual is located, so at the moment we need to find out their interdependence. It is determined that the lower the level of space organization and the higher the level of influence of the individual on the environment, the greater gender orientation in their characteristics should be carried by the environment.

Qualitative environmental conditions of residential entities are a crucial component of a person's social well-being and the basis of their self– realization: the comfort of functional connections, aesthetics of the environment, such factors as socio-role, ergonomic, information content, environmental safety – they affect human life and psychological comfort of the individual (Padgitt, Hund, 2012).

However, there is no stable well-known definition of the concept of a high-quality urban environment of residential formations and a set of its main characteristics, this is due to constantly changing trends, parameters and requests of society in connection with changes in public life, the economy and the development of technology. However, the perception of basic human needs, such as security, also differs concerning a person's gender. When trying to combine the concepts of gender and the living environment, we are faced with the following problem of their relationship under the level of personalization of the actual environment in which the individual is located, so at the moment we need to find out their interdependence.

Probably the most important characteristic of a residential environment is its personalization – individual structuring by the user (resident). The inability to personalize the environment causes feelings of alienation, insecurity, and uncertainty. When personalizing the environment, a person determines his/her individuality, an individual identifies the space around his/her living environment with his/her personality and gives a part of the space a subjective essence. With the help of the phenomenon of personalization, we can identify a person with the place of our life, and distinguish our living environment from the general one.

Urban studies of the housing environment are currently beginning to regenerate after the global crisis. There are more and more projects focused on the humanization of urban spaces, and each user of a street, public object or residential yard.

One of the trends of modern foreign urbanism that combines gender psychology and architectural psychology for practical design is the idea of "sustainable development", which has a global, interdisciplinary character and is relevant for modern science, too. R. Gifford, in his review article "Environmental Psychology and Sustainable Development", emphasizes that instead of trying to understand, for example, the patterns of space zoning and territoriality in space, researchers are more interested in global issues of transport, urbanization and crimes against the environment.

Conclusions

A analysis of scientific works devoted to the problem of perception of space from the point of view of gender indicates the existence of differences in preferences, requirements for a residential unit and the assessment of its qualities by men and women. The existence of differences in preferences for the choice of housing by men and women, requirements for the spatial organization, as well as differences in the assessment of the qualities of the housing environment is also evidenced by a sociological study conducted by the author.

The requirements for the functional and spatial organization of the environment depend to a greater extent on the gender scheme of a person's behaviour. This creates a demand for expanding the range of influence of individuals on the urban environment of residential formations, which would satisfy different consumers. It is established that for aspects of the formation of the housing environment, it is more important to take into account gender patterns of behaviour and take into account the specifics of the activities of gender groups.

When trying to combine the concepts of gender and the living environment, we are facing the following problem of their relationship under the level of personalization of the actual environment in which the individual is located, so at the moment we need to find out their interdependence. It is determined that the lower the level of space organization and the higher the level of influence of the individual on the environment, the greater gender orientation in their characteristics should be carried by the environment.

It is assumed that further deepening of gender research in the architectural environment should contribute to the development of models of residential units that are most desirable for each of these types of consumers. This will significantly enrich the supply in the housing market and should satisfy a wider range of consumers.

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АСПЕКТИ ФОРМУВАННЯ ГЕНДЕР-ЧУТЛИВОГО МІСЬКОГО СЕРЕДОВИЩА ЖИТЛОВИХ СТРУКТУР

Анотація. *У статті розглядаються аспекти сприйняття простору з позиції гендеру, та їх вплив на формування якісного житлового середовища. Наведено результати проведеного соціологічного дослідження, які свідчать про існування відмінностей у вимогах до формування міського середовища житлових утворень та в оцінках її якостей чоловіками та жінками. Вимоги до функціонально-просторової організації середовища залежать в більшій мірі від гендерної схеми поведінки особи. Це в свою чергу продукує попит на розширення спектру впливу особистостей на міське середовище житлових утворень, яке б задовільнили різного споживача. Встановлено, що для аспектів формування житлового середовища важливішим є врахування гендерних схем поведінки та врахуванням особливостей діяльності гендерних груп.*

При спробі поєднати поняття гендер і житлове середовище, стикаємось із проблемою їх взаємозв'язку відповідно до рівня персоналізації власне середовища в котрому перебуває індивід.

Ключові слова: *житлове середовище, гендер, стать, гендерна схема поведінки.*

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VISUAL AND AESTHETIC EVALUATION OF THE TRACE HIGHWAYS IN THE LANDSCAPE

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Abstract: The article substantiates the relevance and considered methodological approaches to the architectural and landscape organization of road space as a set of measures aimed at improving its visual and aesthetic characteristics.

Key words: highways, architectural and landscape organization of the road environment, visual and aesthetic characteristics of the road space.

Problem statement

Highways belong to large territorial objects and are one of the components of the anthropogenic landscape, characterized by their dynamic development. According to the law of Ukraine "On highways", public roads are divided into state and local roads. State highways are divided into international, national, and regional ones. (In Ukraine, the length of international highways is 9311.2 km; the length of national highways is 7175.2 km; the length of regional highways is 8492.6 km; the total length of state highways is 46640 km). Local highways are divided into territorial, regional, and district roads (the total length of territorial roads is 21.661 km) (Postanova Kabinetu ministriv Ukrainy. "On approval of the list of public roads of state significance", 2019).

The constant growth of motorization in Ukraine (as of 2019, its level reached 232 cars/1000 people) and the volume of road traffic set new requirements for the development of the automobile road network (Three facts about the Ukrainian fleet in 2019: infographic, 2019). The State Building Regulations for

urban planning (DBN B. 2.2.-12:2018) provide for a higher level of motorization (280 cars/1000 people), which is almost half the same indicator for Western European countries (DBN B.2.2-12:2019 "Planning and development of territories", 2019).

Since the beginning of March 2020, the national project "Big Construction" has been launched in Ukraine, within the framework of which it is planned to carry out major repairs and build 6,500 km of roads from scratch by the end of 2020 (Tymoshenko K. 2020). The program provides for the construction of the Kyiv bypass road with a so-called semicircle with a total length of almost 150 km. It will have six sections and connect seven routes of international and national significance. A bridge with approaches over 25 km long across the Dnipro river will also be built. Since drivers often use Kyiv as a transport corridor for travelling between different parts of the state, the bypass road will help reduce their travel time by 40–60 minutes.

A similar transport situation has developed in Lviv, where trucks are moving along the existing Lviv bypass, which is already overloaded with public transport. In this regard, traffic jams form at the exit from the city, and transport moves at speeds of up to 30 km/h. To solve the problem, it is planned to build a bypass road exclusively for freight transport and transit cars, which will move to the international checkpoints "Shegyni", "Krakovets", "Grushiv", "Rava-Ruska" and to neighbouring regions. The new ring will connect four state roads at a distance of 20–25 km from Lviv (Krystoforov V. 2020).

In the Lviv region, one of the first roads under the Big Construction Program – Lviv – Pustomyty – Medenychi – was opened. The 47.5 km long road is the shortest route to the resort town of Truskavets and the village of Skhidnytsia, and also connects Lviv city with Pustomytivskyi, Mykolaivsky and Drohobych districts. The repaired road is an alternative to a busy M-06 Kyiv-Chop on the Lviv-Stryi segment and allows to unload the international highway by 35 %. In the region in 2020, it is planned to update another 250 km of roads (Ukravtodor opened the first road of the "Large construction" program, 2020). In Transcarpathia, it is planned to build and repair 370 km of state roads **(***Large road construction*, 2020**)** this year**.**

In terms of technical characteristics, roads in Ukraine mostly still do not meet international norms and standards, which generally negatively affects the socio-economic development of territories. The experience of developed countries shows the importance of coordinating technical issues of road construction with the problems of traffic safety, sanitary and hygienic protection and environmental protection, as well as with architectural, landscape and information aesthetic tasks: a harmonious combination of the road with the surrounding landscape, identifying natural features of the area, masking unsightly elements of the environment, improving the architectural and artistic qualities of roadside structures, etc. The road, as a component of the territory, should not only keep its integrity and picturesqueness but also, on the contrary, reveal and enhance the visual perception of natural and cultural features.

Accordingly, the study of architectural and landscape issues of road construction, taking into account the large amount of work, is relevant for Ukraine, since the quality of roads is primarily determined by the harmonious interrelationships of their functional, technical, artistic and aesthetic characteristics. In Ukraine, when designing roads, the main attention is mainly focused on engineering, technical and economic issues, but visual and aesthetic issues of road environment formation are practically not considered, although during construction such components of the natural landscape as terrain, vegetation, water mirrors, etc. are subject to changes. Earthen embankments, recesses, bridge structures, and anti-noise screens become active components of the landscape of both the road itself and the environment, forming a new type of cultural landscape at all its spatial levels (local, regional, and country). In this area, only the first steps have been taken from the point of view of landscape planning, which will allow developing certain areas in specific landscape design (*Landscape planning in Ukraine*, 2014).

Analysis of research and publications

Methods and principles of architectural and landscape design of new and reconstruction of existing roads are considered in scientific researches of V. Babkov, A. Kosarevsky, I. Morozov, Yu. Zapolsky, A. Sardarov, I. Rodichkin, O. Krzhizhanivska. The authors' works emphasize on the importance of integrated consideration

of functional, technical, architectural and landscape factors in the design of roads and an ensemble approach to the visual and aesthetic solution of highways and their surroundings.

Purpose of the article

The purpose of the article is to determine the basic principles and means of architectural and landscape organization of new and improving the aesthetic qualities of existing highways.

Research and discussion

The methodology of the landscape design of highways is widely covered in foreign and domestic literature. These issues have long been studied in the United States and Western European countries. At the end of the nineteenth century, new principles of road design were introduced in the United States, developed with the participation of landscape architects K. Wo and F. Olmsted, who developed the concept of "park roads". Such roads were conceived as "alleys of landscapes**"** for driving. After the spread of new principles of road construction in the United States, they became popular in Western Europe in the 1920s and 1930s (***Road design and protection of the character and visual features of the landscape***, 2020).

In the mid of the twentieth century, the theorist and practitioner of American landscape architecture, Dzh. Simonds wrote: "The freeway will be built based on scientific data, a diverse volume in shape, expanding and narrowing, with which the driver can move quickly, safely and freely, enjoying the landscape formed in such a way as to maintain vigour and not weaken vigilance" (Saimods Dzh. 1965).

Polish landscape architects generally rely on the theory of the so-called "internal spaces of the landscape" by Ya. Bohdanovsky and consider the highway as a kind of chain of such spaces (*Road design and protection of the character and visual features of the landscape*, 2020).

Urban researchers in the post-Soviet space at the turn of the 1980s and 1990s noted the predominant emphasis on the technical aspects of the problem in their countries, and in the early 1990s, they began to pay attention to the landscape aspects of highway tracing. Yu. Zapolsky notes that in Russian urban planning science, external transport systems are usually studied from the functional and economic side. He offers the concept of "landscape space of a highway", which allows us to consider the road as "a single architectural space in relation to the landscape and all structures serving it, both from the point of view of function and technology and from the point of view of architectural aesthetics" (Zapolsky Yu. Y., 1993). Belarusian scientist A. Sardarov suggests the concept of "road environment", considering that highways have spatial significance since their physical parameters occupy a certain space in the environment. Besides, the communication nature of a highway is that a person moving along the road continuously receives information about the environment within the visual accessibility of the route. A. Sardarov also believes that one of the tasks of landscape architecture is the harmonious inclusion of anthropogenic objects in the natural environment and names three goals: – maximum preservation of natural forms, – a harmonious combination of the road with the natural landscape, – disclosure of the natural advantages of the natural environment in the spatial corridor of the highway (Sardarov A. S., 1993).

Among Ukrainian landscape architecture theorists, this concept finds application in the principle of constructing an elongated landscape composition, divided into sections that have a certain independent meaning and are called "architectural basins" (Rodychkyn Y. D., 1990; Krzhyzhanovskaia O. H., 2015). An architectural and landscape basin is understood as a section of terrain characterized by the unity of landscape features. The boundaries of an architectural basin can include terrain fractures that limit visibility; borders of various landscapes that coincide with the borders of localities, large bridge crossings, and forest edges. Each architectural pool must have main axes or centres of architectural compositions. The main axis can be lines of the main landforms, river valleys, or a road. The centres of architectural compositions are objects that stand out from other elements of the landscape and give the pool its originality and individuality (such objects are called dominants). Localities, individual large buildings, hills, water surfaces, as well as objects and buildings of roadside complexes, structures on mountain roads, bridge crossings, and decorative landscaping groups are

dominant. Each pool should have no more than one dominant, in some cases, for example, in a monotonous open area, the dominant can visually distinguish between architectural basins. Architectural basins on the same road should be diverse (while maintaining the unity of the road style over quite long distances), which reduces the monotony of traffic. In the course of the research, the style of each architectural pool and all elements of the route are clarified. For each architectural basin, a common background (it can be created, for example, using landscaping) and dominants are provided. The missing dominants or delineations are identified, and the missing ones should be created using road architecture tools.

Architectural and landscape design of roads is subject to several requirements and recommendations aimed at preserving and improving the existing landscape, historical and cultural monuments, improving traffic safety, reducing fatigue of drivers and passengers, minimizing the harmful impact of the road on the environment. At the same time, the main principle of architectural and landscape design is to create a single architectural ensemble from all elements of the road landscape – the roadway, roadbed, linear buildings, plantings, design and equipment of the road, – and coordinate it with the landscape. These goals are achieved by comprehensively solving the following tasks:

– fitting the road into the landscape to improve traffic convenience, reveal the characteristic features of the local landscape, and prevent the highway from disturbing the local landscape;

– addition and improvement of the natural landscape through landscaping, planning and drainage earthworks, road equipment with technical and public service facilities;

– spatial tracing of the road, that is, compliance with the requirements for connecting elements of the route in space, ensuring its smoothness and clarity of direction;

– visual orientation, that is, the creation of a system of such visual landmarks that allow drivers to anticipate changes in the direction of the road and road conditions over a long distance, and thereby choose a safe driving mode.

At a time of strong investment pressure on the landscape, before designing and building, it is necessary to assess the visual impact of investments, especially large-scale ones, in particular, highways, which has led to an interest in landscape research methods. The European landscape convention since 2000, ratified by Ukraine in 2006, obliges the conduct of relevant pre-project studies (*the European Landscape Convention*, 2006).

In the United States, the VRM (*Visual Resource Management*) system was developed in 1980 and updated in 2011, which allowed it to be used in Europe. The VRM system is designed for inventory and visual analysis of landscapes of large territories before starting the design of energy, transport facilities or deforestation activities.

Inventorisation of visual qualities of a landscape aims to show landscapes of certain areas, the distance between them, and the level of visual perception. Based on these three characteristics, landscape sections are classified into four categories (I–II – highest rating, III – average, and IV – low), which later serve as source materials for design.

Assessment of visual quality begins with the beauty of the landscape by taking into account seven factors: topography, vegetation, reservoirs, colouristic, adjacent landscapes, uniqueness, and anthropogenic changes. Landscapes belong to three groups: A – the highest, B – the middle, and C – the low. At the same time, it is assumed that all territories accessible to the public have the beauty of the landscape; the highest rating belongs to landscapes with the greatest heterogeneity of components and harmonious spatial composition.

Assessment of the level of visual perception of a landscape is carried out by evaluating indicators of the method of using the territory, the degree of anthropogenic impact, public interest, the method of using neighbouring territories, the definition of special plots, and so on.

Visual perception zones are divided into three groups:

– the zone of the first and middle plan (*foreground-middleground*) is an area that is visible from each road from a distance of 5-8 km (here you can see in detail any economic activity);

– background area (*background*);

– the rest of the territory that is visible from each road at a distance of up to 24 km, a zone (*seldom-seen*) that rarely comes into view (Orzechowska-Szajda J., Podolska A. 2013).

Using of the results of the study following the described VRM technique allows to maintain the attractiveness of landscapes in the zone of visual perception of the highway and thereby improve the visual and aesthetic characteristics of its spatial environment.

Conclusions

The processes of road construction and repair in Ukraine usually considered as construction and engineering measures, practically without taking into account the visual and aesthetic characteristics of the road space and their impact on the perception of surrounding landscapes. During the implementation of major road construction and repair programs, it is significant to pay attention to the preservation of landscapes and increase their artistic and aesthetic appeal.

Architectural and landscape design should cover all stages of road formation: a feasibility study of the architectural solution of the road; pre-project analysis; development of the general scheme of the architectural solution; survey and tracing of the road; development of the project of landscaping, recreation areas, small architectural forms and elements of external landscaping. At the stage of pre-project research, it is advisable to study landscape corridors of highways (primarily of international importance) from the point of view of their visual impact on the tracing and functioning of the road, using theoretical provisions and research methods common in foreign practice.

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ВІЗУАЛЬНА ТА ЕСТЕТИЧНА ОЦІНКА ТРАСОВИХ ШОСІВ НА ПЕЙЗАЖІ

Анотація: *В статті обґрунтовується актуальність та розглянуті методичні підходи до архітектурно-ландшафтної організації простору автомобільних доріг як комплексу заходів, спрямованих на вдосконалення його візуально-естетичних характеристик.*

Автомобільні дороги є великими територіальними об'єктами і складовими елементами антропогенного ландшафту. В Україні зростання рівня автомобілізації і обсягів автотранспортних перевезень ставлять нові вимоги до розвитку автомобільної дорожньої мережі. З березня 2020 року в країні започаткований і реалізується національний проект "Велике будівництво". В рамках цього проекту планується зробити капітальний ремонт і побудувати 6500 км доріг до кінця 2020 року.

Досвід розвинутих країн свідчить про важливість узгодження інженерно-технічних питань дорожнього будівництва з архітектурно-ландшафтними та інформаційно-естетичними задачами. Передусім – це гармонійне поєднання дороги з навколишнім середовищем та виявлення природних і культурних особливостей ландшафту місцевості й її трасування. З огляду на великий обсяг спорудження автодоріг, дослідження архітектурно-ландшафтних питань, формування дорожнього простору є актуальними для України.

Такі питання тривалий час досліджуються в США та західноєвропейських країнах. У 1980 році в США була створена, а в 2011 році оновлена система VRM (Visual Resource Management), що дозволило використовувати її і в Європі. Система VRM призначена для інвентаризації та візуального аналізу краєвидів великих територій перед початком проектування об'єктів енергетики, транспорту та заходів з вирубування лісів. Європейська Конвенція Ландшафтів, ратифікована Україною у 2006 році, зобов'язує проведення відповідних досліджень.

Проводячи великі програми будівництва і ремонт автошляхів, необхідно надавати належну увагу збереженню ландшафтів і збільшенню їх візуально-естетичної привабливості. З цією метою доцільно використовувати теоретичні положення та методики досліджень, що використовуються в зарубіжній практиці.

Ключові слова: *автомобільні дороги, архітектурно-ландшафтна організація середовища автодоріг, візуально-естетичні характеристики дорожнього простору.*

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NATURE AND FORTIFICATION STRUCTURES OF DOWNTOWNS IN THE CITIES OF KYIV REGION IN THE 17th – END OF THE 18th CENTURIES

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Abstract. This article describes the nature and fortification structure of downtowns in the cities of Kyiv region in the 17th – late 18th centuries. Geometric and proportional properties of strengthening downtowns are determined. Stages of formation and features of changes in the fortifications of the downtown and castles during the 17th–18th centuries in the cities of Kyiv region are revealed.

Key words: downtowns, castles, nature, fortification, cities of Kyiv region, 17th–18th centuries.

Formulation of the problem

History of historical cities formation in Ukraine is a subject of numerous publications on theory, history and restoration of architecture. In architectural science, the composition of buildings, details and configuration of downtowns' defensive perimeter and connection with an architectural complex of a castle are not established. The material presented in this article on nature and fortification structure is important for the theory and history of architecture, protection, preservation and restoration of the historical and architectural heritage of Ukraine.

Analysis of researches and publications

Some of the aspects of the problem of studying and preserving urban complexes in Ukraine were revealed by M. Bevz, V. Vecherskyi, P. Rychkov, G. Petryshyn, O. Boyko, V. Slobodyan, B. Kolosok, O. Mykhailyshyn and others. However, researchers mainly analyze large and medium-sized settlements with a well-preserved historical and cultural heritage. Although, analysis of downtowns shape of the Kyiv region city of the 17th – end of the 18th centuries remains insufficiently disclosed.

Main research material

During the 17th – late 18th centuries, the armed forces of Poland, Turkey, Sweden and Russia deployed numerous fronts of military operations in Ukraine. As a result, in response to threats, downtown and castles in towns are beginning to improve: ditches are being dug and embankments, bastions, ravelins and additional traps are being set up. Unfortunately, the fortification system did not become a guarantee of security against Tatar raids. Some towns without resources for reconstruction are gradually declining. For example, the town of Germanivka in the 17th – late 18th centuries underwent several phases of looting and destruction. According to the 1787 lustration, there were 111 settled subjects, a Greek Catholic church, a wooden courtyard in the middle of the castle, surrounded by a moat, fence and piles. (Sulimierski, F., Walewski, W. 1880. T. III p. 66) The downtown of Germanivka was surrounded by a wooden fence with a gate, and in the middle, there was a sprawling and elongated market square (Fig. 1).

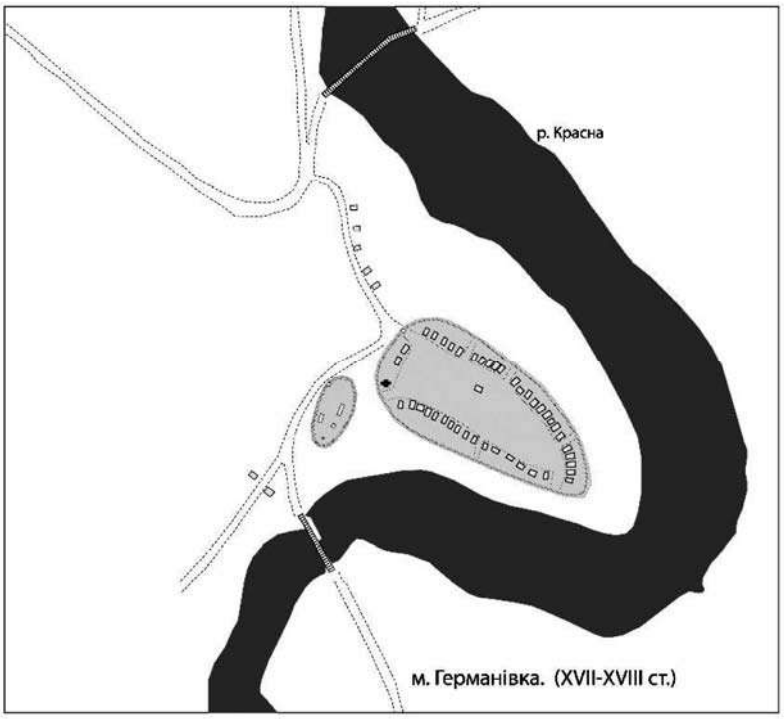

Fig. 1. Germanivka. Downtown in the 17–18 century. Description of the author

Powerful fortifications were built in important administrative centres. At the end of the 17th century, the Pechersk Fortress was built in Kyiv. In the four hetman's capitals – Baturyn, Gadyach, Hlukhiv and Chyhyryn – complex defence systems were arranged. In the regimental cities-residences – Bila Tserkva, Bratslav, Vinnytsia, Korsun, Kaniv, Poltava, Nizhyn, Starodub, Lubny, Chernihiv, Pereyaslav, Myrhorod, Pryluky, Uman, Kalnyk, Kropyvny, Cherkasy, defence fortifications were repeatedly rebuilt. Korsun in the 13–15th century, like most Ukrainian towns, was sparsely populated. King Batory in 1584 granted the settlement with the privilege of Magdeburg law and in 1616 there were 1300 Cossack houses (Funduklei, I., 1852. p. 510). In 1674 Korsun by order of Hetman Ivan Samoilovich, became a collection centre for Cossack troops. (Funduklei, I., 1852. p. 512) In 1765 there were 172 houses in Korsun, the castle was surrounded in a square by an embankment with corner bastions and a deep moat, on the embankment there was an oak fence, a drawbridge, a gate with loopholes, and a summer house on the gate. In the middle of the castle are the governor's house and other buildings. (Funduklei, I., 1852. p. 512) However, cities and towns of the lower administrative level also had a proper fortification structure, which was good in the military episodes (Sokyrko, O., 2017).

During the development of cities, natural defensive factors were used – curved banks or estuaries, which affected the size and configuration of the outline of the downtowns. For example, the town of Kagarlyk was built on a significant rise, provided on the one hand with water, and on the other ravines, which complicate the approaches (Sulimierski, F., Walewski, W., 1880. T. III, p. 667). Owners of the cities especially helped to obtain privileges from the king and initiated the construction of fortifications. For example, the town of Smila already existed during the reign of King Casimir. The Lubomyrsky princes built a wooden castle in Smila and kept a garrison in it. The city was surrounded by ramparts and sharp pillars. In 1775, King Stanislaus Augustus granted the Magdeburg law to the city (Funduklei, I., 1852. p. 505). The castle in Smila was located on a hill, above the pond, had the shape of a quadrangular earthen fortification, there were bastions in its corners. (Funduklei, I., 1852. p. 506) Also, there was a wooden church and chapel on the territory of the downtown in the 17th – late 18th centuries. Already in the middle of the 19 century in Smila, there were 3 Orthodox churches, a Catholic church, an Old Believers Chapel, a Jewish synagogue and two houses of prayer, 60 shops, 1 inn, 10 hostelries. (Funduklei, I., 1852. p. 506).

Under similar circumstances, the border town of Stebliv developed, which King Stefan Batory handed over to the Cossack warlord Teteria. He built a castle on an island surrounded by water and rocks on all sides,

fortified it with a rampart and a high fence, and built a church in the middle of the castle. (Funduklei, I., 1852. p. 516) Later, in the middle of the 19th century, there were 257 houses in Steblev, of which 2 were brick, 2 Orthodox churches and 5 small shops (Funduklei, I., 1852. p. 515).

Pavoloch was an illustrative example of the use of natural factors that influenced the spatial characteristics of the downtown. The town has been known since the 16th century as the private property of the founder of the Zaporizhzka Sich Evstahiy Dashkevych. Downtown was surrounded on three sides by the river Rastavytsia, and on the fourth, northern side, both banks of the reservoir were connected by a moat and a high embankment. There was a fence on the shaft and a brick gate with a tower in front of which stood stags. In the southern part of the downtown, on a hill above the river, was a castle. It was separated from the town by a moat and a shaft. The castle was surrounded by triple rows of fences, and in the middle was a wooden building (Funduklei, I., 1852. p. 494). Near the castle stood a wooden, three-story church of the Archangel Michael and a Roman Catholic Church. Church owned a bell tower with five bells located above the castle gates. The brick church was built at the expense of Prince Stanislaw Lubomyrsky in the second half of the 18th century (Pohilevich, L., 1864. pp. 213–214).

Most towns were fortified with ramparts and ditches. Thus, in Gostomel (in ancient times it was called Ostromyr) earthen fortifications date back to the 15 century. In the second half of the 17th century, by order of Colonel Semen Paliy, the castle in Gostomel was fortified with a moat and a high rampart, and a wooden church of the Pokrova was built on the yard (Pohilevich, L., 1864. pp. 102–103). In the town of Ivankiv, located on the left bank of the river Teteriv, the castle was surrounded by a high rampart and a deep wet moat. It had two bridges and gates, above one mounted a clock tower. (Pohilevich, L. 1864.p. 156) Archaeological explorations of the 20th century suggest that on the site of the castle in Ivankiv during the 10 – 13 centuries there was an old ruthenian settlement. (Chmil, L. 2012.) The town of Ruzhyn, located on the banks of the river Rastavytsia in the XV century was strengthened by ramparts and ditches. In the city centre was the Church of St. Nicholas. It was wooden until 1821. (Pohilevich, L. 1864.pp. 109–110) In particular, the town of Kornyn, built on a flat plateau, had a castle surrounded by a moat and an embankment. Near the castle stretched long-distance Zmiyiv bulwarks. (Pohilevich, L. 1864.p. 229)

In the town of Lypovets, near the bend of the river Sob, there was a castle, which was separated from the city centre by a deep moat. (Pohilevich, L. 1864.p. 300) In the town of Vilkhovets near Zvenyhorodka, the fortifications consisted of bulwark and moat that ran along the isthmus between two rivers. The moat was filled with water, and a fence stood on the shaft. According to legend, merchants from Greece and Lviv lived in Vilkhovets until the middle of the 17th century (Pohilevich L., 1864, p. 392). In the town of Kivshovata, the castle was located on a hill on the right side of the river Shtana. It was provided with a bulwark and a double palisade (Pohilevich L., 1864, p. 419).

The defensive circle was arranged so that it created a territorial separation of the downtown from the rest of the settlement. For example, downtown of Tetiyiv, surrounded by an embankment, in which the centre of the spatial composition on the market square was a wooden church of the Assumption of the Blessed Virgin (Pohilevich L., 1864, p. 447). The principle of spatial independence is used in the town of Zhyvotiv. In it, the downtown located on the peninsula had good fortifications. The isthmus connecting the peninsula with the earth's surface was dug by a canal. The settlement around was surrounded by a palisade (Pohilevich L., 1864, p. 458).

The town of Rokytne had earthen fortifications around it, and the castle was surrounded by a moat and a high bulwarks. The three-dimensional integrity of the downtown was emphasized by the wooden Church of the Nativity of the Blessed Virgin (Pohilevich L., 1864, p. 527). In the town of Medvyn, the city center and the castle were surrounded by bulwarks. The settlement had wooden churches of St. Nicholas, St. George, Savior, All Saints and shoemaker's guild church (Pohilevich L., 1864, p. 576). The city of Mezhyrich also had reliable earthen fortifications (Pohilevich L., 1864, p. 636).

In several settlements, only castles were securely fortified. This was the case in the town of Rasava (now the village of Rasavka) where the castle was surrounded by a high bulwark (Pohilevich L., 1864, p. 559). In the town of Zhabotyn on the mountain, there was a castle with buildings that had cellars, (Funduklei I., 1848, p. 11) and in the centre, there were three wooden churches – the Assumption of the Blessed Virgin, St. Nicholas and the Transfiguration (Pohilevich L., 1864, p. 658). In 1867, there was a wooden trading building on a brick

basement on the market square, covered with boards, with a wooden floor, 6 compartments, with 6 windows and 6 doors, 7 fathoms long and 4 fathoms wide (Derzhavnyi Arhiv Cherkaskoyi Oblasti, pp. 374–381).

Among the established examples of the fortification system, non-standard solutions were also used. For example, in Brusyliv, the castle was surrounded by five bulwarks and ditches, which were filled with water from the river. They came to the castle from the south and west (Sulimierski, F., Walewski W., 1880. T. I, p. 398). In the centre was a brick church, and near it the monastery of the Capuchins. An important place in the city centre was occupied by a wooden church of the Resurrection built in 1711 (Pohilevich L., 1864, p. 167). Brusyliv is divided into Old and New City. The New City was formed after the charter of King Henry IV and began with a drawbridge near the stone gate with a tower. It ended with a separate gate (Ogiyenko I., 2012).

In the town of Lysyanka, which received the Magdeburg law in 1622, there was an example of the use of various materials in the fortification of the downtown and the castle. The downtown was surrounded by a high fence, and the castle was square, brick and had towers in the corners (Funduklei I., 1852, p. 499). The castle was located at the bend of the river Gnylyi Tikich. The downtown was formed around an elongated market square and had four wooden churches. In 1846, there were 13 Jewish inns in the downtown and a brick house with 8 shops (Derzhavnyi Arhiv Cherkaskoyi Oblasti).

In the town of Makariv (first name Voronyn) the castle stood at a distance from the downtown. It had a rounded shape of the plan, surrounded by a bulwark and a moat (Kuchera M., 1976). Figure 1651 shows a panorama of the settlement, which represents the architectural solution of the castle and the fortification of the downtown (Volkov N., 2016). The castle was surrounded by a shingled roof, and in the middle stood a wooden courtyard with corner alcoves. The downtown was dominated by a three-storey wooden parish church surrounded by a single-storey detached building. Around the centre were towers connected by a fence and defensive barriers – slingshots.

Valuable from a historical point of view was Trakhtemyriv, which began to build in the late XVI century for the hospital of the Zaporozhian Cossacks. Probably, at this time the city centre had fortifications, as Stanislav Zholkevski army looted the settlement, in particular looted salt warehouses, which caused great damage to the Cossacks. In 1664, after many decades of destruction, the monastery-hospital in Trakhtemir continues to function and fight for privileges (Heidenstein R., 1857). In 1626, in a letter, the Greek Catholic Metropolitan Joseph Veliamyn-Rutsky mentions the Cossack fortress of Trakhtemyriv and the fact that it has a treasury (Golubiev S., 1883). In 1664, after many decades of destruction, the monastery-hospital in Trakhtemyr continues to function and fight for privileges (Krykun M., 1999). At the beginning of the 18th century, the settlement declined, and the lustration of 1765 testified to the absence of the castle and other fortifications (Sulimierski F., Walewski, W., 1880. T. II, pp. 580–581). The character and fortification of Trakhtemirov is revealed by a romantic engraving of 1687 (Boplan G., 1990). It suggests that the downtown of Terekhtemyriv was located on a mountain plateau, was surrounded by a wall with towers, gates, and in the centre of the settlement was dominated by the monastery watchtower.

The nature of the location and fortification structure in the 17 – late 18th centuries in most places retained the properties typical of Old Ruthynian and Lithuanian times. This is confirmed by the typology of the location of Slavic-Ruthynian settlements formulated by archaeologist Mykhailo Kuchera, namely, settlements on remains; settlements on remnant-like capes; cape settlements; settlements on the edge of a natural obstacle; settlements on elevations; settlements on flat terrain (Kuchera M., 1976, p. 252). The outlines of the downtown and castles repeated the shape of natural relief. Instead, deep ditches and high embankments were dug in the areas to be stored.

In Fastiv, the castle was surrounded by a trapezoidal section of a high shaft, and its area was 800 square yards (Funduklei I., 1848, p. 26) (Fig. 2). In Rzhyshchiv, the castle was surrounded by a moat and a shaft 2 fathoms high, the length of each side was 30 fathoms. The old church was provided with a similar shaft and moat. The downtown of Rzhyshchev was surrounded by a shaft 1 yard high, the length and width were about 40 yards (Funduklei I., 1848, pp. 36–37).

In Brusyliv, the height of the shafts was 4 yardsticks, the southern bulwarks were 135 yardsticks, the eastern and western 124, and the other two, which formed an angle, had 4 yardsticks (Funduklei I., 1848, p. 40). In the Pohrebyshche, the castle was located between two ponds and was 400 yards long (Funduklei I., 1848, p. 43). The downtown of Romanivka was surrounded by a semicircle by an embankment.

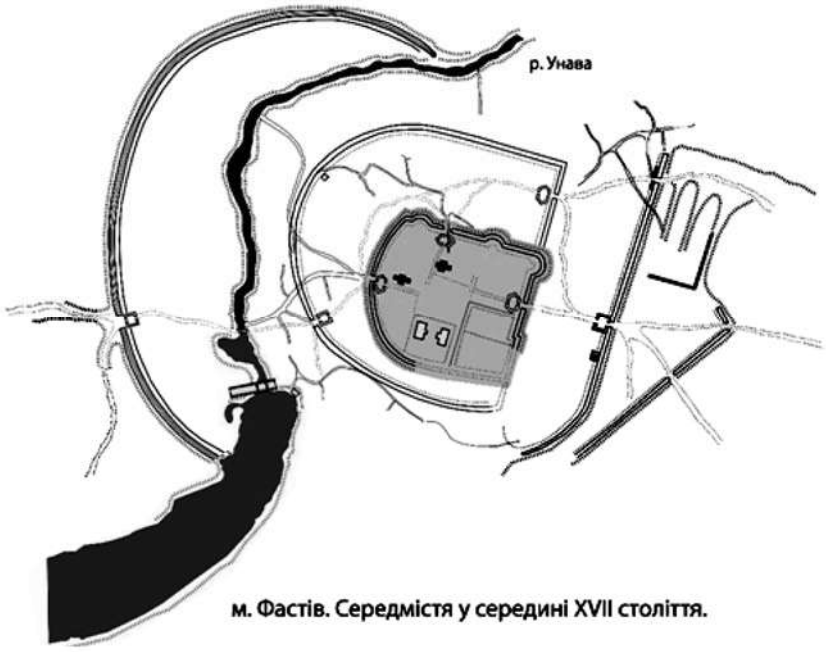

Fig. 2. Fastiv. The downtown in the 17th century. Description of the author

Unava River at both ends. It had 437 fathoms long and 1 to 4 fathoms wide (Funduklei, I., 1848. p. 50). The downtown of Tetiev was surrounded by a shaft 3 fathoms wide and 2 fathoms high. (Funduklei I., 1848. p. 56).

On the map of Guillaume Levasser de Boplan in 1650, cities with reliable fortifications were: Lysyanka, Vilshana, Smila, Chyhyryn, Kryliv, Borovytsia, Cherkasy, Moshny, Korsun, Boguslav and others. This indicates the existence of a territorial defence strategy. Instead, numerous wars and Tatar raids, a small number of hostages and small arms, the decline and lack of repairs to the fortifications determined its low effectiveness. There were more private cities than royal ones. Thus, nature and fortification structure of the city centre during the seventeenth and eighteenth centuries depended primarily on the resources, ambitions and erudition of the landowner.

The strategically important location of the settlement caused conflicts between the owners. Thus, the town of Buzhyn in the early 17th century belonged to the Kyiv St. Nicholas Monastery. Korsun elder Danylovych selected him. The location of a profitable pier, a convenient crossing of the Dnipro and a strategically valuable area of concentration of troops led to the construction of powerful fortifications of the castle and the downtown. Here, in 1654, the Kosh Ataman Sirko escaped from the encirclement of the voivode Chernetski. To avenge Chernetski burned the city. Near Buzhyn in 1663, Yuri Khmelnytsky's army defeated an army of Moscovites led by Romodanovski. In 1677 Buzhyn was destroyed by the Turkish army. (Pohilevich L., 1864, p. 674–676). Boplan's map shows that the castle is located on the north side of the fortified downtown to control the crossing of the Dnipro. According to Schubert's map, the city centre had a large, sprawling spindle-shaped market square, on the west side of which stood a church (Fig. 3).

Town of Stavyshche, (old name Lubomyr), had a complex system of earthen fortifications. The lustration of 1629–1632 states that this town was founded by the mayor eight years ago and had 800 houses. Instead, this year it burned down almost completely, leaving barely 60 houses. (Derzharchiv u Krakovi) Already on the map of 1664 with images of the siege of Stavyshche, four earthen redoubts were recorded, which protected the bulwarks of the city with bastions (Fig. 4). Downtown had a triangular outline, and in the northern corner was a castle with corner earthen ramparts, pots and a bastion. Before the destruction of the settlement in 1665, there were 6 churches by the Polish Crown Hetman Stefan Charnetsky. The ensemble of the market square was emphasized by the wooden churches of the Intercession and the Assumption of the Blessed Virgin. The brick Roman Catholic church was built in 1756 (Pohilevich L., 1864, p. 435).

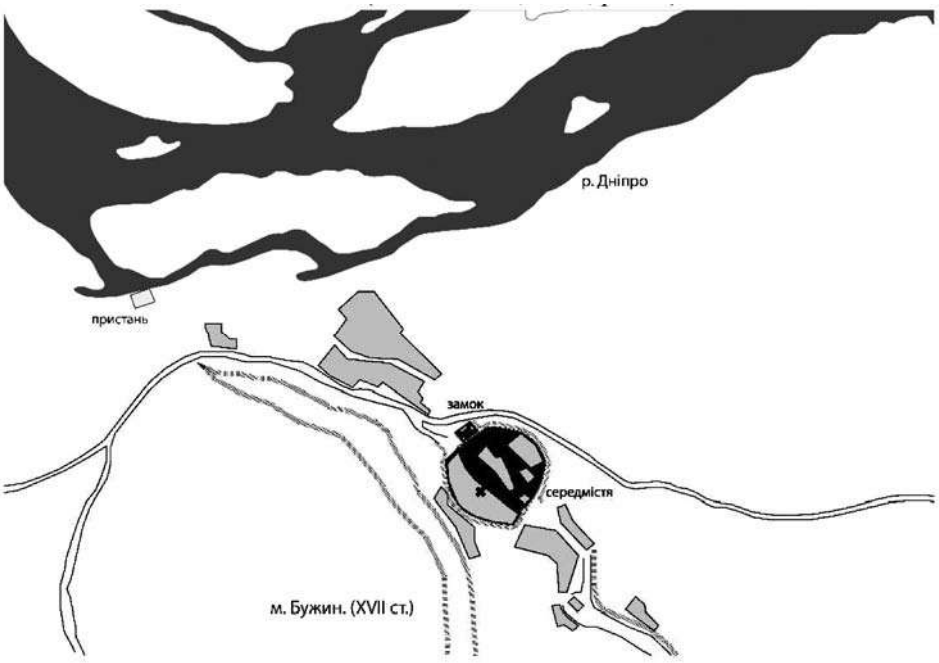

Fig. 3. Buzhyn. The downtown in the 17th century. Description of the author

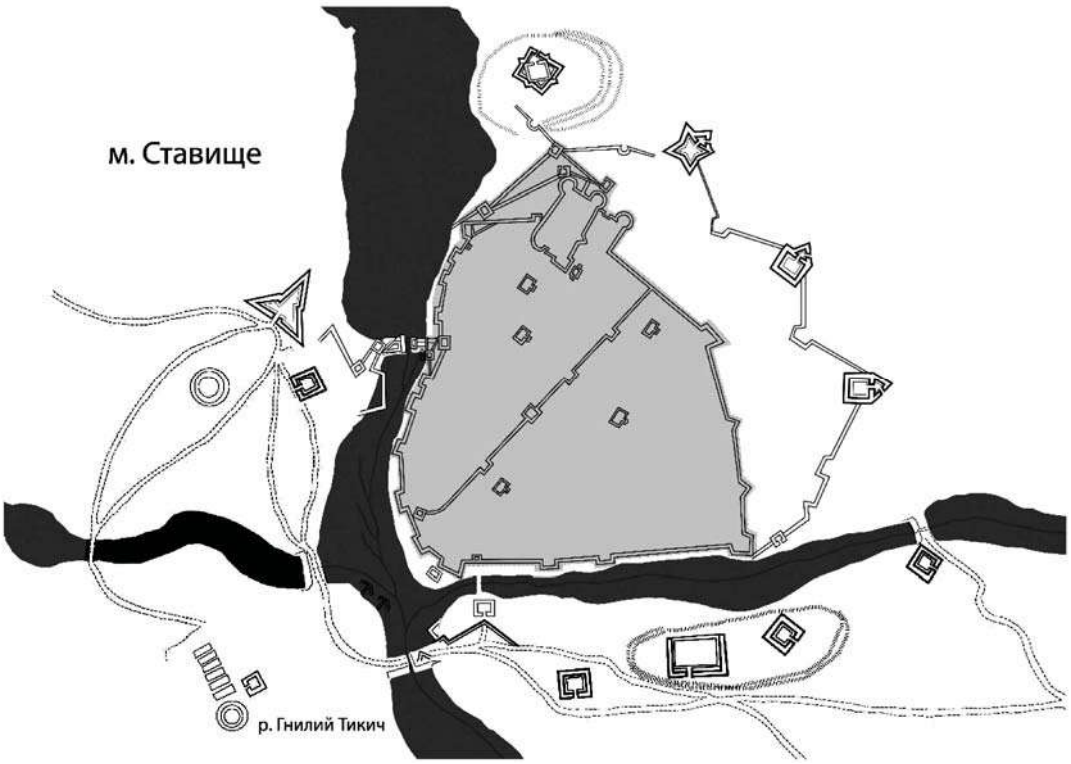

Fig. 4. Stavyshche. The downtown in the 17th century. Description of the author

The similar fortification was in Kryliv (now flooded by the Kremenchuk Reservoir). The surrounding system of bulk redoubts was also used here, and a castle stood in the centre (Pohilevich L. 1864, pp. 670–671).

The combination of the contours of the round castle and the downtown is the most common variant of the fortification structure of the Kyiv region of the 17th – the end of the 18th centuries. For example, this planning composition has survived to this day in Trylisy near Fastiv (Fig. 5). The lustration of 1629–1632 describes in detail the characteristic features of this settlement: "*this town lies above the river Kamyanka. Surrounded by an*

oak fence and a deep moat dug. In this town, there is a castle set on a hill. It is surrounded by a moat, an embankment and piles. The castle has one entrance gate and three towers. It has old buildings. There are three rooms with rooms. Cellar and kitchen. There are 60 houses in the town, 10 of which are under castle order. " (Derzharchiv u Krakovi) To the north of the castle was a wooden church. In 1779 another building dedicated to the Great Martyr Dmytriy was built, and in 1856 a new one was built – to St. Basil the Great (Pohilevich L., 1864, p. 696).

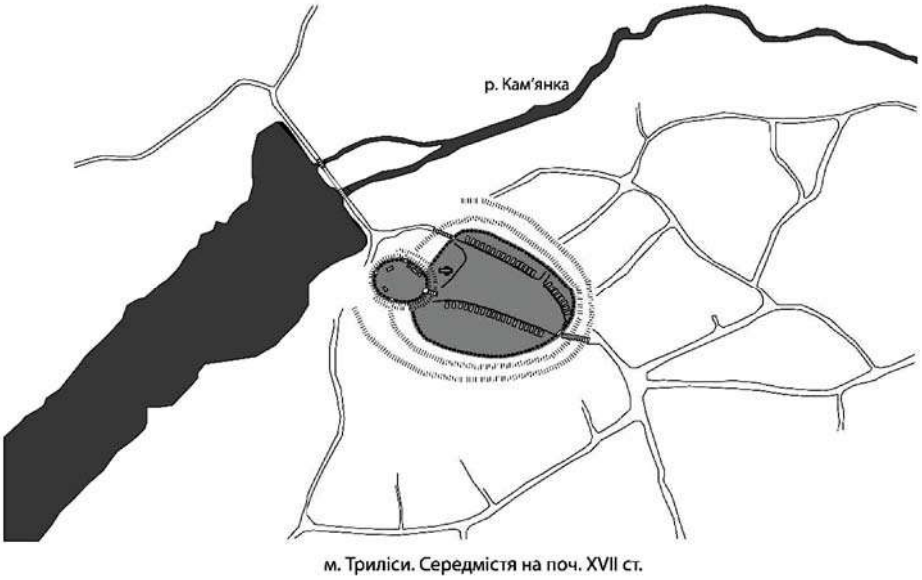

Fig. 5. Trylisy. The downtown in the 17th century. Description of the author

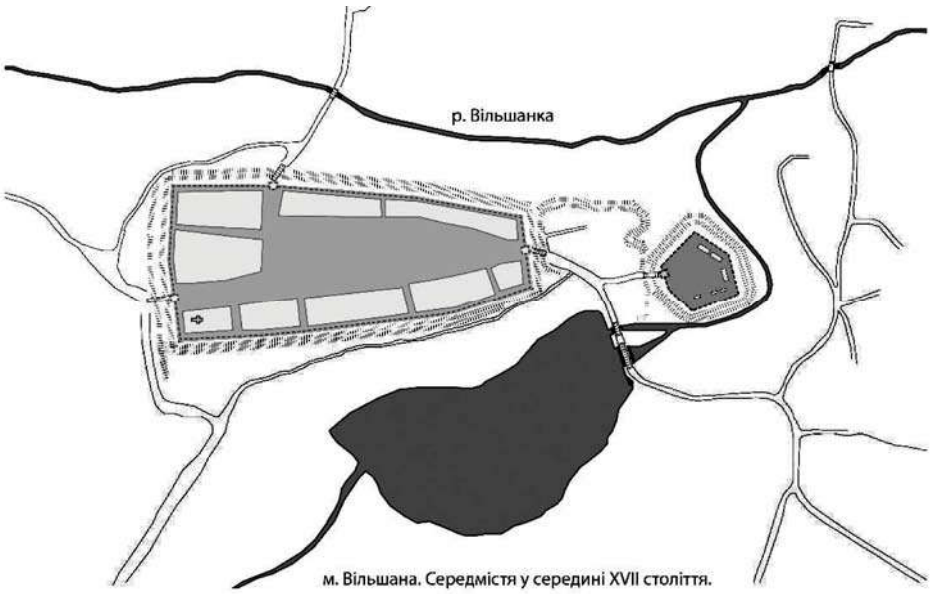

Fig. 6. Vilshana. The downtown in the 17th century. Description of the author

In the town of Dymer, the downtown is formed around an elongated trapezoidal market square. After the destruction of the town in 1703 by the army of Colonel Semen Paliy, it was rebuilt for several decades. In the 18th century, downtown was no longer protected by reliable fortifications. Only the castle was rebuilt. This is confirmed by the lustration of 1767: *"Dymer Castle stands in a new place, above Ruda. There is a moat around this castle. It is surrounded by a fence. There is a new gate at the entrance to the castle. There are two small*

huts at this gate. In the middle of the castle is an old house. It has four rooms. The baby has a lyamus, a bakery, a kitchen, a spy, a stable, a cart and a well. Behind this castle, in front of the gate, there is a new courtyard with two huts and two porches. It is surrounded by piles and built under the residence of the governor." (V. Stefanyk LNNBU)

As a result of calculating the ratio of the size of the city centre and the castle, it was found that the most common correspondences were 4: 1 (Buzhyn, Vilshana (Fig. 6), Germanivka, Dymer, Pavoloch and others), less often 3:1 (Trylisy, Skvyra) and 5:1 (Lysyanka, Stavyshche).

Conclusion

At the beginning of the 17th century, most of the defensive perimeter of the downtown had the awry configuration. Towers and bastions were not used in their defence system. For some examples, the gate structures were architecturally different. The defence system of castles was almost the same as the fortifications of the city centre.

In the second half of the 17th century, towers and bastions appeared in only a few castles as a result of reconstruction and modernization. Downtowns maintain a simple defence system. Only in some examples of the defensive perimeter earthen bastions and redoubts are built.

In the 18th century, as a result of Swedish expansion (1700–1721) and the Haydamat uprisings (1734, 1750, and 1768), the fortification system gradually declined. In some cities, fortifications are being strengthened. Thus, in 1737 additional fortifications were built around Vasylkiv (Arhiv Yugo-zapadnoi Rossii). Instead, the fortifications of the downtowns did not become an obstacle for the Haidamaks. A large number of fortified cities marked on the map of Boplan lose their status and fortification.

The defensive architecture of the castles continues to be maintained, partially regenerated and assigned to penitentiaries. For example, the audit of Zvenygorod Castle in 1765 states that the castle is surrounded by an oak fence, near the gate there are covered buildings for Cossacks and prisoners. A watchtower was built on them. In front of the gate, there is a building covered with bast, an oak barn with a gallery for defence against haidamaks, a ground-covered stable and a cart. (Funduklei I. 1848, p. 450) At the beginning of the 18th century, a wooden castle with a double palisade and a rampart in Kivshovata was destroyed (Funduklei I., 1848, p. 55). As a result of the capture in 1768, the Haidamaks destroyed the castle with four corner towers in Lysyanka, (Funduklei I., 1848, p. 499) and a castle with high ramparts in Smila (Funduklei I., 1848, p. 11).

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ХАРАКТЕР ТА ФОРТИФІКАЦІЙНИЙ УКЛАД СЕРЕДМІСТЬ У МІСТАХ КИЇВЩИНИ XVII – КІНЦЯ XVIII СТОЛІТЬ

Анотація. *У статті описано характер та фортифікаційний уклад середмість у містах Київщини XVII – кінця XVIII століть. Збройні війська Польщі, Туреччини, Швеції, Росії впродовж XVII – кінця XVIII століть розгортали в Україні численні фронти воєнних операцій. Відтак, у відповідь загрозам, середмістя та замки у містах починають покращувати: копають рови та насипають вали, бастіони, равеліни та влаштовують додаткові пастки. Підчас розбудови міст використовували природні оборонні чинники – вигнуті береги або гирла річок, які впливали на розмір та конфігурацію абрису середмість. В кількох поселеннях надійно укріпленими були лише замки. На карта Гійома Левассера де Боплана 1650 року вирізнено міста з надійним фортифікаційним забезпеченням, а саме: Лисянка, Вільшана, Сміла, Чигирин, Крилів, Боровиця, Черкаси, Мошни, Корсунь, Богуслав та інші. Це свідчить про існування територіальної оборонної стратегії. Натомість численні війни і татарські набіги, мала чисельність залоги і незначне озброєння, занепад та відсутність ремонтів фортифікацій визначили її малу ефективність. Приватних міст було більше, ніж королівських. Відтак, характер та фортифікаційний уклад середмістя впродовж XVII–XVIII століть, в першу чергу залежав від ресурсів, амбіцій та ерудиції землевласника. В результаті обрахунку співвідношення розмірів територій середмістя та замку встановлено, що найбільш розповсюдженими були відповідності 4:1 (Бужин, Вільшана, Германівка, Димер, Паволоч та інші), рідше 3:1 (Триліси, Сквира) та 5:1 (Лисянка, Ставище). У другій половині XVII століття, в результаті відбудови та модернізації, лише в кількох замках з'являються башти та бастіони. Середмістя зберігають просту оборонну систему. Лише в окремих прикладах оборонного периметру, будують земляні бастіони та редути. У XVIII столітті, внаслідок шведської експансії (1700–1721 рр.) та гайдамацьких повстань (1734 р., 1750 р. та 1768 р.) фортифікаційний уклад середмість поступово занепадає. Оборонна архітектура замків продовжує підтримуватися, частково регенерується і призначається під пенітенціарні заклади.*

Ключові слова. *Середмістя, замок, характер, фортифікаційний уклад, міста Київщини, XVII–XVIII століття.*

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SIMULATION MODELLING DEVELOPMENT IN DESIGN OF ENERGY EFFICIENCY IMPROVEMENT OF ARCHITECTURAL SOLUTIONS

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Abstract. The article deals with the methods of using and improving the work of the simulation modelling method in architectural design. As a result, the authors have tried to optimize their work with criteria such as energy demand, environmental impact, geometry, and materials. The rational use algorithm of these software products in the integrated design of energy efficiency improvement of buildings, complexes and urban structures have been proposed.

Key words: simulation modelling, energy efficiency improvement, architectural climatology, energy analysis, BIM design, environmental impact.

Problem statement

The modern information technologies development creates opportunities and prerequisites for the search for fundamentally new approaches to the architectural space organization, new means and techniques of artistic expression in architecture. The new time requirements reflect an attempt to transfer architecture from a designer's subjective ideas plan to the rational plan of objective solutions and tasks, in particular in the architectural solutions energy efficiency design. Due to the Ukrainian law harmonization program with the European Union standards and the adoption of energy development strategy (Nova enerhetychna stratehiya…, 2020), which includes issues ensuring country energy independence, the question of high-quality architectural and energy design arises. Buildings consume about 40 % of the total energy. The European countries reconstruction and new construction requirements are much stricter. For example, as of 2019, the energy consumption standard for new buildings in Germany is <15 kWh per m^2 of a building per year (German Federal Ministry of the Interior, Building and Community (BMI), 2018). The European Performance of Buildings Directive (EPBD) requires all new buildings in the European Union to be “nearly zero-energy” buildings by

2020 (Directive (EU, 2018). In Ukraine, according to current state standards, this indicator is almost 7 times higher – <100 kWh per m^2 per year.

The energy efficiency design software products evolution occurs simultaneously with the growing relevance of these issues and the technical and informational potential development. It is significant to apply them in the early stages of design, where the decisions with the most significant impact on the final energy consumption operational indicators and costs are made

Analysis of recent research and publications

The most widely used concept in architecture theory today – "digital modelling" – cuts across all domains literally: design, engineering, graphics, tectonics, and even the style directions creation, (Hygh, and others, 2012), (Nadyrshyn, 2013). It is not so much associated with the computer-based design tools but with the parametric modelling and new technologies, materials and approaches in construction. We can say that this is a transition to a new ideology, a new way of designing, a new way of thinking in architectural design. The advantages of the computer-based design are high speed, low cost, versatility and convertibility of results, as well as the ability to use network resources for collective design (Shubenkov, 2006). This progress was already anticipated in 1992 by G. A. van Nederveen and F. P. Tolman through introducing the term BIM (Building Information Modelling) (Van Nederveen, Tolman, 1992). The correspondence of individual industry and related systems require certain standardization and consistency both at the conceptual/methodological and hardware levels (Saprykina, 2017), (Khayman, 2008). Therefore, many critical questions are raised by the design practice immersed in interdisciplinary research, the materials behaviour testing and the design processes, which are directly related to the computerization of architectural creativity (Shuldan, 2002), (Shuldan, Brods′kyy, Hutnyk, 2011), (Shuldan, Al-Ahmmadi, Shtendera, 2018). In this article, we have continued to explore the relationship between spatial design and energy efficiency, as it involves computational methods, thermodynamic processes, and experiments with geometrically controlled performance logic. Today there is a significant amount of scientific research and materials that consider simulation models as a component of parametric design but they are not considered as a separate and significant tool for architectural design.

Objective of the article

The simulation models in the energy efficiency improvement design are the object of the article, in particular analytical models created with the help of special equipment and maquettes, and computer models based on digital models (calculated, graphical and multicomponent). The main task of the article is to define simulation models as one of the main tools of architecture research, which is done in several stages – the study of software, their application in educational and practical architectural objects, the study of energy efficiency for the given parameters of computer modelling, and theoretical scientific generalization.

Results and discussions

The last two decades have seen the expansion of modelling and simulation capabilities in architecture, engineering and construction (AEC), which has improved production efficiency, modelling capabilities, and data exchange as well as collaboration between processes. These advances provide the foundation for a variety of next-generation capabilities driven by the development of large-scale integrated digital and physical ("cyber-physical") systems that connect the embedded environment with real-time modelling and analytics via Cloud and IoT technologies. New research programs that combine information science, systems, and sounding using traditional embedded design and engineering systems to support the development of scalable intelligent cyber-physical systems will be one of the central operating means of the next generation construction industry.

The energy efficiency improvements design of architectural solutions, comparison and selection of optimal measures and their sets at any stage can be solved using simulation models. At the same time, the most important among them are the following:

1. External climatic factors simulation.

2. Microclimatic parameters simulation of the building.
3. Building or complex geometry options simulation and selection.
4. Structures selection and calculation.
5. Simulation of the effects of the surrounding development and complexes development prospects.

Simulation modelling, depending on the tasks set, allows you to:

A. Determine the level of aerodynamic form of the building, that is, explore existing buildings, design and adjust the form of the new building and its parts;

B. Determine the level of premises illumination, calculate the insolation, shading and passive solar energy receiving;

C. Solve buildings design issues on open areas and in an existing development, solve issues in terms of their form, planning and dimensions;

D. Associate the previous tasks with:

– adjusting the amount of filtration heat loss in a building or complex of buildings;
– the ability to create appropriate microclimatic conditions around buildings and on their territory;
– the possibility of providing conditions for a comfortable stay on the premises.

E. Recommend and design the use of energy-generating wind and solar elements in the architecture of a building or architectural environment, or, conversely, elements of wind and solar protection.

During the second half of the XX century, as well as the beginning of the XXI century, the leading role in performing simulations and calculations of the certain phenomena impact in architecture played special equipment that performed specific types of simulations. This equipment was usually located on the premises of special laboratories or research institutes. Simulation processes were studied on scale models performed for each type of simulation.

To calculate the illumination of buildings, a device called “Artificial Sky” was used, which was founded in Moscow as part of a complex called Helioclimatron (Гелиоклиматрон – Russian). The device is a dome with a diameter of 17 m and a complex lighting system, built in 1981 for the lighting complex of the Research Institute of Building Physics. In Helioclimatron, the lighting of buildings was modelled (Fig. 1). But at the end of the 60s of the last century, the similar equipment to “Artificial Sky” was installed in the laboratory of architectural physics of the Lviv Polytechnic National University (at that time – Lviv Polytechnic Institute) (Fig. 2). Its employees work on the problems of architectural climatology, as one of the main scientific directions of the Department of Architectural Structures, now the Department of Architectural Design and Engineering. The staff of the Department is still obliged to Bedyl O. T., Zapolskyi V. H., Stasevych I. V. for the establishment of the Architectural Physics Laboratory with its unique equipment and installations. Among the climate simulation installations created during this period, there were: “wind tunnel", “Artificial Sun” (Fig. 3) and stands for research of thermal properties of opaque materials and transmission of thermal radiation by various types of glass. Thanks to this, tests were carried out on the order of enterprises and for scientific experiments of employees of the Department: Shvets Ya. D., Kazakov H. V., Yatsiv M. B., Shuldan L. O.

This type of equipment is now used in the educational process for simulated processes visual demonstration. Working with them provides the necessary basic level of knowledge that allows you to master the corresponding software products. Measurements and simulations using mechanical methods of execution have a large statistical and informational error (due to the peculiarity of measurements – from the conditions of the laboratory itself; the “researcher's factor”, to possible errors in the execution of the maquettes or the use of materials with other characteristics). Software programs also allow you to get more accurate results and use a much wider range of tools (Fig. 4).

Available software products can perform almost all stages of design, construction simulation, impact analysis and operation of buildings or structures – from creating two-dimensional drawings of individual structural or decorative elements to creating objects of complex parametric architecture and objects complete construction process visualization at all stages based on BIM technologies. The European Union and our closest neighbours are rapidly implementing BIM technologies: 1 FIEC, Annual Report, 2017 and European

Commission (European construction industry federation, 2019.); 2 Accenture, Demystifying Digitization, 2017 (Móstoles, Castaño, Coppens, 2017); 3 McKinsey Global Institute, "Reinventing Construction: A Route to Higher Productivity", February 2017 (McKinsey Global Institute, 2017); 4 BCG, "Digital in Engineering and Construction", 2017 (Castagnino, and others, 2016); 5. Economist Intelligence Unit, "Rethinking productivity across the construction industry", 2015 (Lara V., 2015).

Projects based on BIM technology have become the standard for building design in the UK since 2016 (Galiano Garrigós, Mahdjoubi, Brebbia, 2017), and in other countries of Europe and North America, they have officially become as much a part of the design process and documentation preparation as the usual drawings of various two-dimensional building planes. BIM is an abbreviation and stands for 'Building Information Modelling'. In general, Building Information Modelling is an approach to the construction, equipment, maintenance and repair of a building (to the management of the object's life cycle) (Fig. 5), which provides the collection and complex processing of all architectural, technological, economic and other information about the building with all its relationships and dependencies, where the building and everything related to it are considered as a single object.

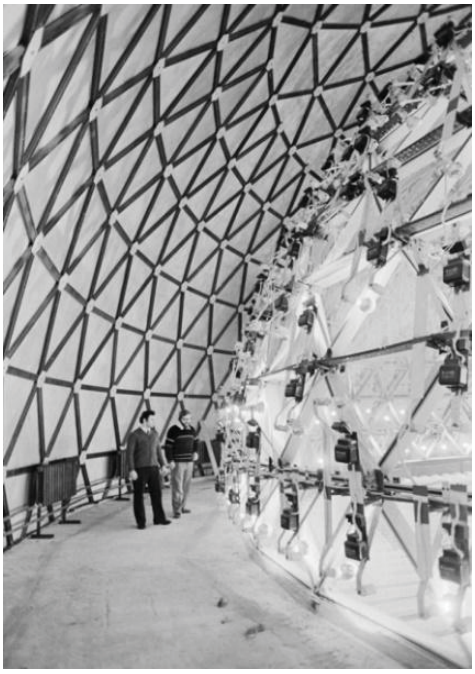


Fig. 1. The "Helioclimatron" of the Research Institute of Building Physics, 1981 (Koshevoy, 1981)

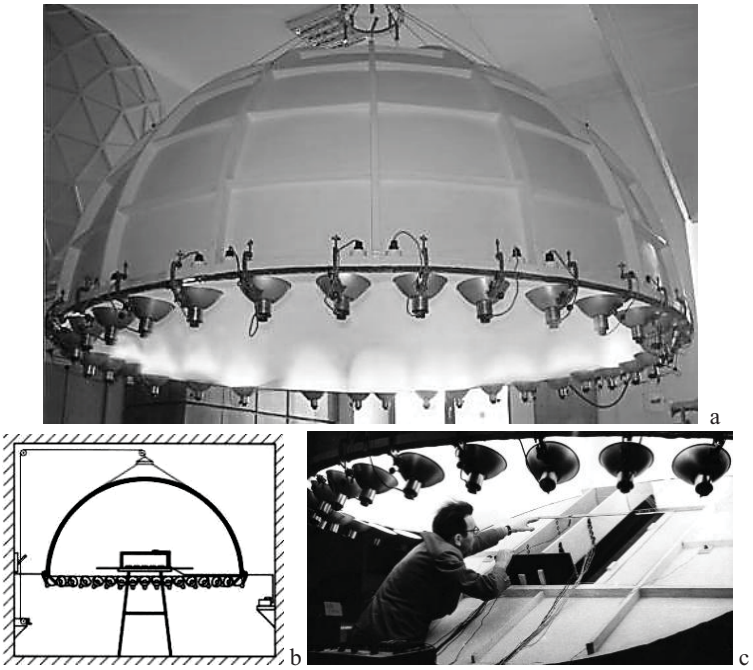


Fig. 2. The "Artificial Sun" installation at Lviv Polytechnic National University, Lviv: modern look (a); installation diagram (b); during the experiment, 1971 (b)

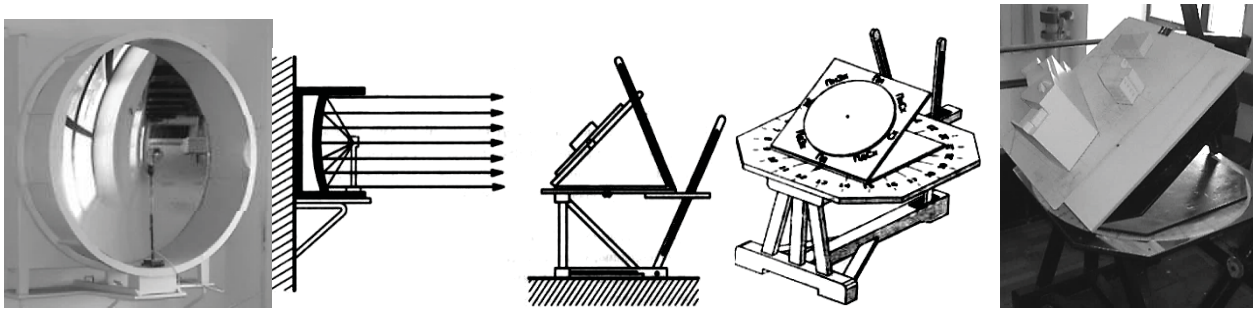


Fig. 3. The "Artificial Sun", Department of Architectural Structures of the Institute of Architecture of Lviv Polytechnic National University, built in the late 1960s

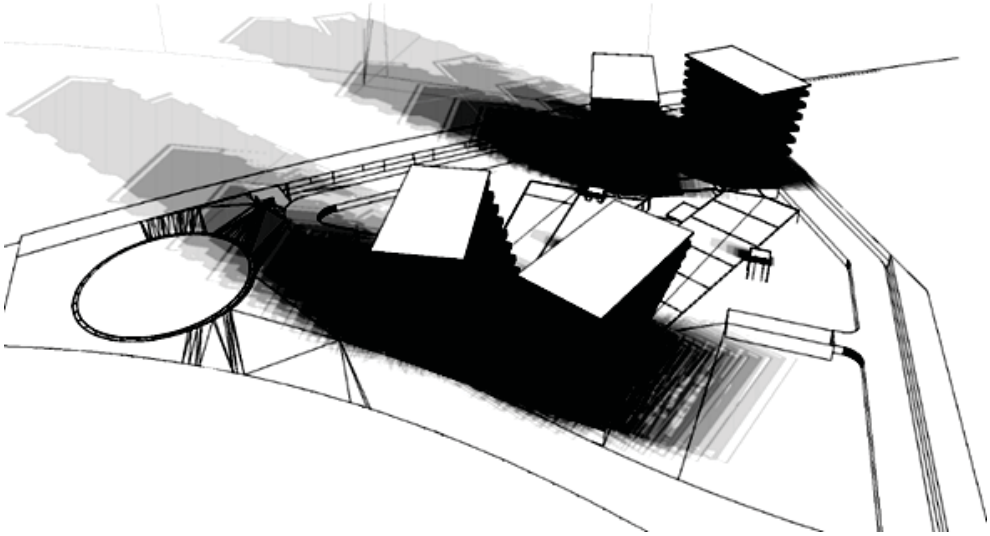


Fig. 4. Facade planes shading and lighting visualization during the year in the Autodesk Ecotect software

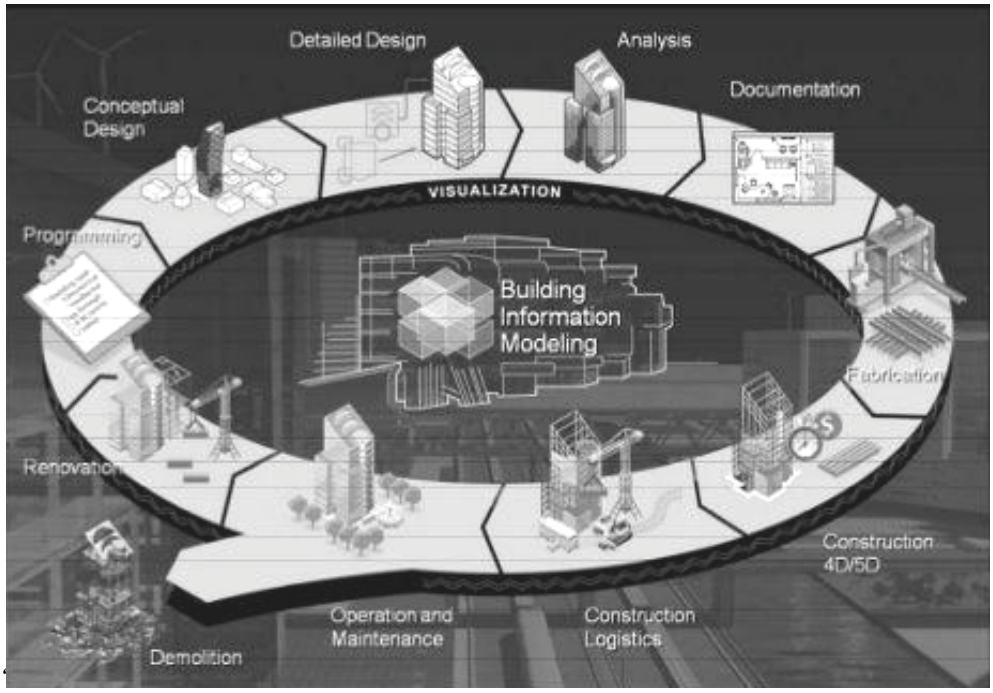


Fig. 5. Object's lifecycle illustration in BIM design (BIM Technology Logo. 2019)

Building models made under BIM standards using data parameters in design software (e.g. ArchiCAD, Revit, MicroStation), or based on export data to other software products (e.g. Autodesk CFD, Autodesk Flow Design, Autodesk Ecotect, EcoDesigner, Velux Daylight, Velux Energy and Indoor Climate Visualizer), can study building lifecycle parameters at all its stages from the first stage of the design process, which in return allows improving the methodology and results of the architectural process, and as a result, the qualitative indicators of building parameters. Design software products are more suitable for creating operating documentation than for a search cycle. Therefore, simulations of processes and preliminary analysis at the stage of creating a conceptual design are usually carried out in a combination with software programs [e.g. ArchiCAD + Autodesk CFD (aeration and aerodynamics), Autodesk Ecotect Analysis + VELUX Daylight (insolation and shading), or RHINO + Grasshopper and software applications (form search, aeration, aerodynamics, insolation and shading)]. Also, at the stage of conceptual design, the architectural model is imported into design and engineering software products, where it is worked out in analytical and calculation models.

To implement such or similar tools in domestic design, it is necessary:
– to create a legal base for working with 3D models;
– to change and update the particular paragraphs of the DSTU on the design documentation;
– to compose libraries of building materials, elements and structures;
– to certify software products;
– to introduce systematic training for students of architectural specialities.

One of the most important parameters in the design, especially in conditions of challenging terrain, restrained urban conditions or high-rise construction is the assessment of the construction impact on aeration, ventilation and wind direction or strength changes, both in the urban context and in the context of a single local building or some of its elements. Architects who design high-rise buildings, to ensure maximum resistance to wind load, resort to a set of measures to improve the streamlining of the building external envelope, such as rounding the edges, or the entire building in the direction of the prevailing winds, creating holes or cellular constructions of facade systems. Another possible technique is to create broken or cut forms to preserve or improve the aeration of neighbouring buildings, or to avoid swirls that create significant difficulties during operation of buildings and open spaces.

To create the most effective building in terms of interaction with the wind, a thorough study of its structure, a shift of influence in the existing environment, and other things are needed. Aerodynamic processes simulations are designed to solve this particular task. One of the best software products for performing this kind of computer simulation of real-world conditions is the Autodesk Flow Design software. Unlike others, in particular online counterparts (e.g. SimScale, AirShaper), it has the widest range of formats for data import, and, as a result, provides the most extensive information about the architectural object of research. It is also possible to perform simulation processes in a general-purpose Comsol.

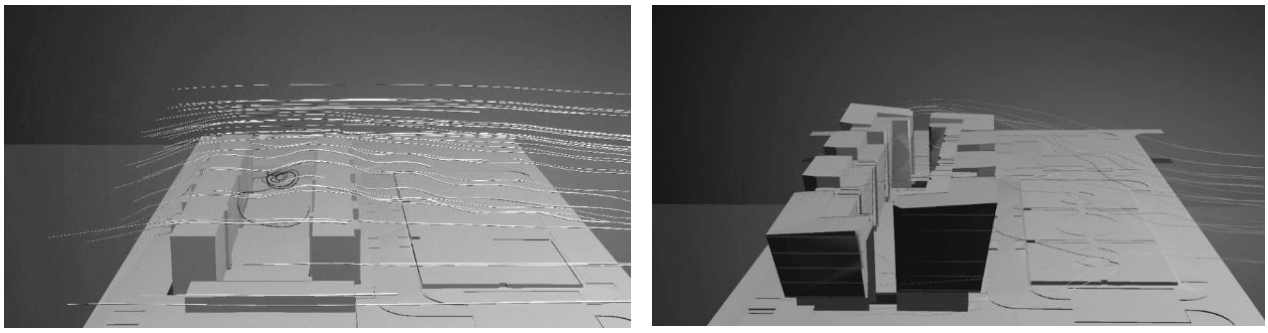
Multiphysics software for the study of physical and chemical processes, but due to the extremely wide range of possible research areas it is necessary to operate with a significant number of optional parameters of the environment and the nature of impacts, so the use of Comsol Multiphysics is one of the most accurate but a quite labour-intensive tool for calculating and visualizing aerodynamic processes in architecture.

Autodesk Flow Design allows performing detailed monitoring of the projected building impact on existing air flows, changes in their direction and speed, to determine the dynamics of these changes both in the general view and on a certain image plane, which can be important for determining flows, for example, at a pedestrian level. Also, the software allows determining the wind load areas in all their possible spectrum (Fig. 6). A significant component of Autodesk Flow Design is a possibility to get a picture of the conventional boundaries of influence on changes in the aerodynamic situation, which is one of the constitutive parameters at determining the location of a building in the urban structure of a district, street or block. The resistance force of a form plays a key role in calculating the aerodynamic properties of a building or structure and depends directly on the geometric characteristics of the object (Fig. 7). It determines the degree of influence of existing and projected air flows on the building or structure itself, as well as on the surrounding development.

It is most efficient to use the appropriate analysis at the stages of pre-design analysis, concept creation and conceptual design since the results of simulations significantly affect the forming and solving of the exterior content.

Another Autodesk product works on a similar principle – CFD, which, however, uses a much wider set of source data, but also produces more accurate calculations. It opens up the potential for using it in the study of not only aerodynamic processes but also the movement of heat in constructions, rooms or buildings, with data that allows further accurate calculations.

On average, a person spends more than 90 % of their time in-buildings every day (U.S. Environmental Protection Agency, 1989). Therefore, under conditions of designing the microclimate of premises, it is significant to obtain information based on simulations not only of processes that occur outside, but also those that the building user faces directly. There are a large number of software tools that allow performing not only calculations according to the specified formulas, but also to conduct a detailed analysis of graphical processes of air movement, insolation, lighting, energy loss, etc.



a b

Fig. 6. Wind flow simulation in Autodesk Flow Design software
current situation (a); after reconstruction (b)

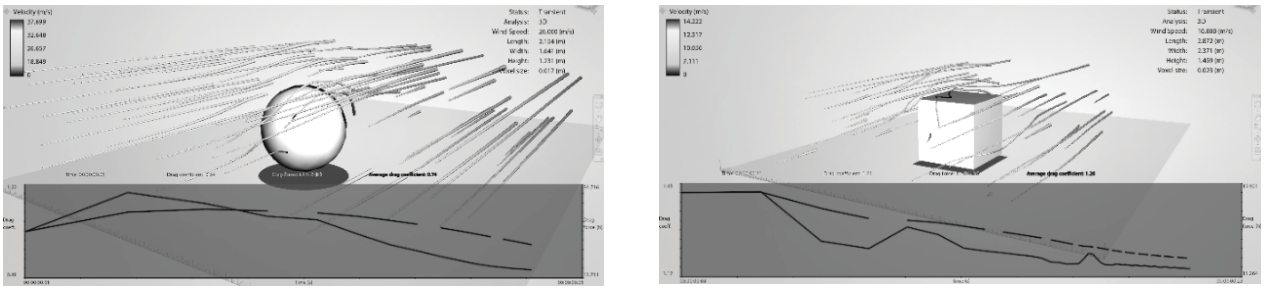


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Fig. 7. Analysis of simple forms in the Autodesk Flow Design software with the determination of the form-resistance coefficient

Among these software tools, it is worth mentioning EcoDesigner software based on the BIM model created in ArchiCAD software, turning it into a BEM (Building Energy Model) based on which process modelling is created. The Energy Analysis component from Autodesk Revit software works similarly: it can be used to analyse the amount of energy supplied and consumed by all rooms and volumes of the building model, both individually and in general. This information helps architects make more informed and cost-effective decisions to increase efficiency, create a better microclimate and reduce the negative impact of the building on the environment. These software tools turn architectural and structural elements of the model into energy models with their energy intensity indicators and thermal conductivity for each of the types of structures.

The following key input parameters are used in this calculation and simulation of processes:

– Geometric characteristics of the research object (form, area, size of translucent structures, etc.);

– The type of building or room contains information about standard specifications depending on the terms of use. For example, usually, during a year a coffee shop works much longer than an office building, which leads to higher energy consumption. The temperature and humidity regime of the bathroom differs from the one in the living room, which also affects the energy calculation model;

– When selecting a location, the appropriate tools specify information about climate data (temperature conditions, orientation relative to the cardinal directions of rooms and surfaces, prevailing wind directions, amount of solar radiation, depth of soil freezing, etc);

– Properties of construction and structural elements: materials and structures of fences, their finishing; the presence of thermal bypass and so on;

– Characteristics of building engineering components (heating and cooling systems, ventilation, hot and cold-water supply, renewable energy sources).

Unlike any of the other software programs for calculating energy consumption and loss, such as PHPP (Passive House Planning Package) and DOE-2, the EcoDesigner ArchiCAD and Revit Energy Analysis software components allow not only getting quantitative data of the corresponding characteristics but also to illustrate the relevant processes within the created models, their progress, possible improvements, and so on. For example, these software components can display isotherms inside of structures and rooms (Fig. 8), which allows

identifying possible problem areas of the future building at the design stage, and, as a result, make changes to the design to avoid them – at the volumetric planning and structural levels.

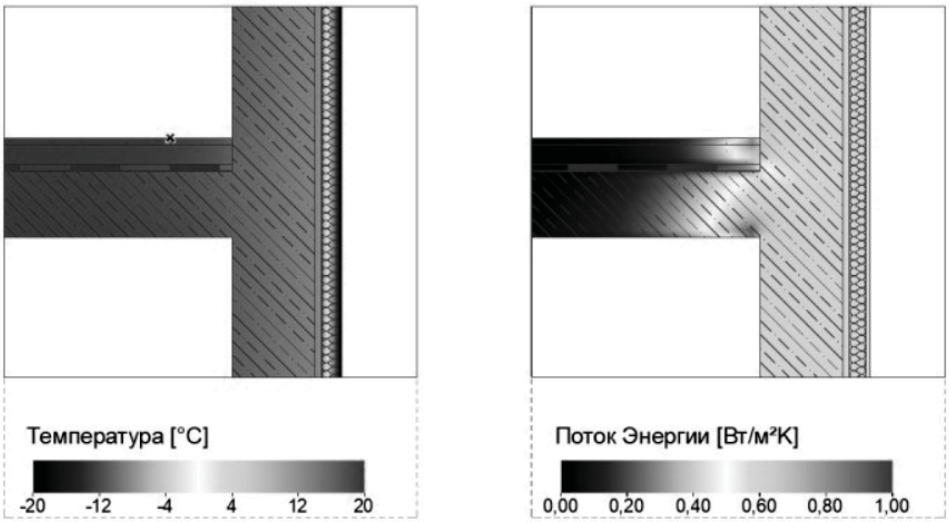

Fig. 8. Visualization of temperature and energy flow inside the structure in the Ecodesigner add-on for ArchiCAD

While tools such as PHPP or DOE-2 are most typically used in the P and RP stages, the advanced functionality of the Ecodesigner and Revit Energy Analysis software allows making preliminary calculations already at the stage of conceptual design.

Within certain zones, VELUX's software products – Daylight, Energy and Indoor Climate Visualizer are effective tools for calculating and visualizing processes, the first of which allows determining the illumination of rooms, dark and light zones and allows solving problems of insolation during analysis, and the second one allows analysing the thermal comfort of buildings at the design stage.

VELUX Energy and Indoor Climate Visualizer software focus on windows and shading from the sun and their influence on the formation of indoor climate, as well as on energy consumption for heating, ventilation, cooling and electric lighting. The software works with a specific orientation and location of the building, taking into account the specificity of particular data. Thus, the software can track the difference between the results of various geometric solutions of the building, the parameter variability of the windows, panels and shading from the sun.

Another VELUX software – Daylight Visualizer is a lighting modelling tool for analysing daylight in buildings (Fig. 9). It works by predicting and documenting the levels of sunlight, illumination, brightness, and visualising the room before the construction of the building. The software does not calculate the premises insolation, which is standardised by the State Building Code but more importantly uses the daylight factor to determine the real state of lighting. DF (daylight factor) provides a qualitative rather than quantitative assessment of natural lighting in premises.

DF is the ratio of room light to outside light during an overcast sky. When the daylight factor is equal 2 %, the room lighting is considered sufficient, although it may require artificial light to perform some works. There is no need for artificial light when the daylight factor is more than 5 %, (Daylight, Energy and Indoor Climate Basic Book, 2014).

Rhinoceros 3D was created as a plug-in for Autodesk AutoCAD, but it gained popularity quickly and, as a result, autonomy (Payne, Issa, 2016). Starting with version 4 of the product, which was released in 2007, there is an available Grasshopper add-on, which is essentially a visual programming editor. Grasshopper allows you to perform almost any actions on a given or exported to Rhinoceros geometry, providing it with certain physical properties using open-type software algorithms. The Dynamo add-on for Autodesk Revit works on similar principles. The main goals are to increase the accuracy of construction and calculations, as well as parameterisation of modelling processes, development of specifications, pre-production of building or structure elements, and the construction process itself.

The software's wide range of tools provides almost limitless possibilities for design and analysis: form optimization, planning structures, volumes, orientation, and height, taking into account the most important set of properties and parameters of external and internal environments for each object.

As for the creation of simulation models and analysis of external climatic factors, the most common tools in this category are Ladybug, Sunflower, Archidynamics Plugin and Trnlizard for Rhinoceros. These tools allow you to perform calculations and visualizations necessary for a comprehensive analysis of a building in a climate and energy environment (Fig. 10). Using Rhinoceros tools at this stage allows you to perform all the listed calculations and visualisations, but the existing library of BIM objects does not allow you to work fully in the software at all stages of designing, which makes the software and applications effective at the stages of concept and sketch designing.

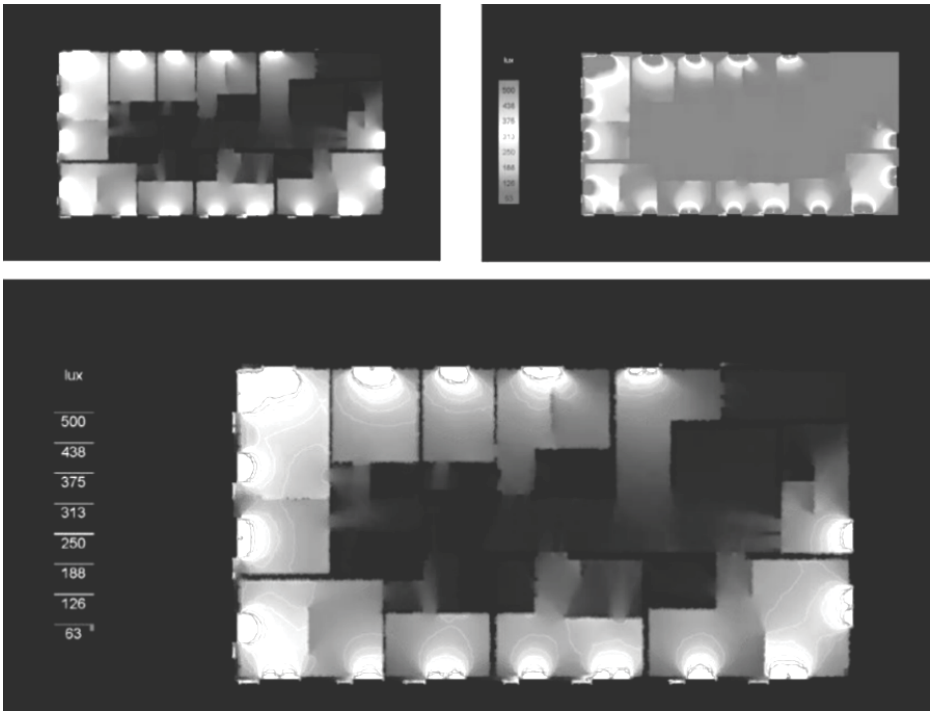

Fig. 9. A calculation example of indoor lighting in Velux Daylight Visualizer

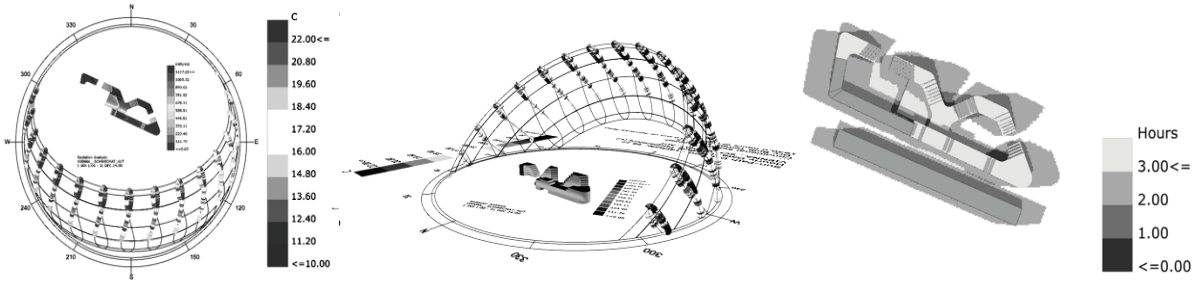

Fig. 10. Analysis of shading and solar radiation input in the Ladybug application

Conclusions

The simulation modelling method in architectural design has gone from devices and equipment of the 60s of the last century, through the first attempts of computer analysis of climate data Termo-Danfoss and the use of models on the ADA Soft platform (MDA) in the late 2000s to modern computational applications of available volume modelling software programs: ArchiCAD, Autocad, Revit. Energy efficiency improvement of architectural solutions, comparison and selection of optimal measures and techniques at any stage of design is solved by 1 – climatic factors simulation; 2 – microclimatic parameters simulation of the building; 3 – checking

the building or complex geometry options; 4 – structures selection and calculation; 5 –simulation of the effects of the surrounding development and complexes development prospects. However, at this point, a single software product cannot perform all the necessary processes.

That is why only the combination of software allows you to pass all the stages of pre-project analysis, design and construction to solve the problems of increasing energy efficiency. For example, ArchiCAD (or similar) + RHINO + Grasshopper (form search), Autodesk Flow Design, CFD (aeration and aerodynamics), Autodesk Ecotect Analysis + IESVE, HIAT-2, HIAT-3, VELUX Daylight Vizualizer (insolation and shading); software bundles Flow Design – RHINO – Grasshopper, Archicad – SketchUp – PHPP (at the stages of EP, P, RP).

Accurate calculations, visualizations and taking into account more data are one of the main ways not only to improve the energy efficiency of buildings but also to increase the overall level of design solutions in architecture. However, computer modelling is just a tool and not a universal remedy that can replace knowledge and direction.

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РОЗВИТОК СИМУЛЯЦІЙНОГО МОДЕЛЮВАННЯ У ПРОЕКТУВАННІ ПОКРАЩЕННЯ ЕНЕРГОЕФЕКТИВНОСТІ АРХІТЕКТУРНИХ РІШЕНЬ

Анотація. *Вимоги нового часу переводять архітектуру з площини суб'єктивних уявлень проектувальника в раціональну площину об'єктивних рішень. Розвиток сучасних інформаційних технологій створює передумови і можливості пошуку принципово нових підходів до організації архітектурного простору, нових засобів і прийомів художньої виразності в архітектурі. У своїй статті ми продовжили досліджувати взаємозв'язок між архітектурним проектуванням та енергоефективністю, а основне її завдання визначили як розвиток методу симуляційного моделювання з метою покращення енергоефективності архітектурних рішень. Проведення дослідження відбувалося у кілька етапів: визначення переліку основних впливів, аналіз існування програмних продуктів, їх практичне застосування у навчальному, реальному та пошуковому проектуванні, обчислення енерговитрат за змінними параметрами, теоретичне наукове узагальнення результатів та формування рекомендацій.*

Покращення енергоефективності архітектурних рішень на будь якій стадії проектування досягалося завдяки створенню симуляцій впливів, адже саме вони обумовлюють термодинамічні процеси і дозволяють досліджувати геометричнокеровану логіку продуктивності. Найважливішими серед них є: симуляція зовнішньокліматичних чинників; симуляція мікрокліматичних параметрів будівлі; симуляція і вибір варіантів геометрії будівлі чи комплексу; добір і розрахунок конструкцій; симуляція впливів навколишньої забудови та перспективної розбудови комплексів. Також окреслено перелік найважливіших архітектурних задач, що вирішуються завдяки застосуванню методу симуляційного моделювання.

Привернення уваги до деяких аспектів історії розвитку симуляційного моделювання, зокрема, в лабораторії інституту архітектури Національного університету "Львівська політехніка", дозволяє осмислити суть і форму його застосування сьогодні, а також відслідкувати еволюцію програм покращення енергоефективності та інструментів архітектурного проектування. Автори оптимізували роботу з критеріями, зокрема такими як потреба в енергії, вплив на навколишнє середовище, геометрію і матеріали. Значить аналіз та апробація найбільш поширених програмних продуктів з погляду застосування у цій галузі, як результат, дозволили запропонувати комбінації та способи їх використання для архітекторів.

Ключові слова: *симуляційне моделювання, покращення енергоефективності, архітектурна кліматологія, енергетичний аналіз, BIM-проектування.*

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THE INFLUENCE OF GENETIC MEMORY AND MEMORY OF GENERATIONS ON THE CHANGE OF THE HABITAT

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Abstract. This article examines the phenomenon of generational memory and its impact on people with changing living conditions. As a result of theoretical research on the concept of "memory of generations" the main hypotheses of this study were formed, covering several aspects: the memory of generations has an impact on the choice of the living environment when changing the residence; there are constant interdependencies between the level of transmission of values of different generations; with increasing level of functional priorities of a man the level of similarity of dwelling decreases that was inherent in different generations.

Key words: memory of generations in architecture, living environment, values in the choice of dwelling, human living environment.

Problem statement

Man during his life repeatedly changes the living environment. The reasons may be quite different, but the natural desire of everyone to improve living conditions is clear. Residential development and the organization of the living environment is a priority for anyone (Bromley, 2005). The processes of globalization, the tendency of labour migration of residents of western and central Ukraine to the EU form a change in values concerning residential architecture. The architectural expressiveness of the exterior of the dwelling recedes into the background before the increased indicators of living space or more successful placement of a residential building in the city system (Volodymyr Durmanov, 2004). However, with a stable demand for dwelling, multi-apartment residential architecture has acquired the features of standardization, which in no way reflects the full range of human social needs. These processes negatively affect the identification of the urban environment of individual cities and the comfort of its housing.

The process of forming the living environment is guided by market trends, sometimes contrary to current norms and recommendations of sanitary gaps and regulatory indicators of density and superficiality of buildings (Dmytrenko, A. 2019)

It has been scientifically proven that a person's choice and values are influenced by many socio-cultural factors, among which the main ones are those that are formed in the first stage of human life and passed from generation to generation (Fangqing Lyu, 2019). This phenomenon of "generational memory" has an impact on all spheres of human life and is reflected in scientific works in various fields, medicine, psychology, sociology, culturology. The relevance of the study is formed by the need for a detailed study of the phenomenon of

generational memory, the process of its transmission and assimilation by a human, as well as its impact on the architecture of the living environment.

Analysis of recent research and publications

The concept of generational memory and genetic memory is quite new in the field of architecture and refers to architectural sociology (Jones, P. R., 2006). In sociology and philosophy, this phenomenon has been studied since the middle of the twentieth century by E. Zemach (Zemach, E. M., 1983), G. Hagestad (Hagestad G. O., 2003), J. Sutton, K. Windhorst (Sutton, J., & Windhorst, C. 2009, 2012) and others. Thus, P. Nora (Nora, Pierre, 1989) interprets the concept of "memory of generations" as the transfer of value and socio-behavioural characteristics of man from one generation to another in the process of natural assimilation through social institutions: schools, universities, places of work etc. In psychology, this concept was studied by A. Koriat and M. Goldsmith (Koriat, A., Goldsmith, M., 2000), L. Levine (Levine, L. J., 1997) and others.

Socialization of scientific theories at the end of XX and the beginning of the XXI century formed a scientific interest of this phenomenon in various spheres of human life. Some components of the memory of generations in architecture and ways to evaluate them were studied by M. E. Heidmets, V. Yu. Durmanov, K. A. Liika (Heidmets M. E., 2019), J. Goodman (Goodman, J., 2016), M. M. Gabrel, (Gabrel M. M., 2018), B. S. Cherkes (Cherkes B. S., 2015) and others.

Objective of the article

The article aims to study the influence of the memory of generations on the values of housing change and to determine the priority links of this phenomenon that have an impact on the formation of the architecture of the living environment. The object of research is the architectural organization of the living environment. The subject of the study is the manifestation of the memory of generations for the choice and formation of human habitat.

Our previous studies of the features and mechanisms of the qualitative type of sociological survey in the context of the study of the impact of generational memory on residential architecture (Smadych I., 2020) allowed us to form the following hypotheses of this study:

- the memory of generations is preserved throughout all human life and has a significant impact on all aspects of the formation of the architecture of the living environment;
- features of a person's first dwelling have a direct impact on all other cases of change of housing through attempts to consciously or unconsciously reproduce or interpret the elements of his first home, which are valuable to him;
- a specific case of the level of memory transmission of generations has a direct impact on all subsequent generations.

Results and discussions

This article is devoted to determining the degree and mechanisms of influence and assimilation of intangible characteristics of socio-mental life and their impact on the architectural component of the living environment. This study was conducted based on the method of sociological survey and the method of comparison, as the most effective in the analysis of quality indicators of human life. The method of the sociological survey used was a descriptive survey consisting of 3 blocks of questions, which are structured in a questionnaire for more complete data collection. The target audience of respondents is 210 people aged 15–86, who are citizens of Ukraine, which is the minimum number for conducting a qualitative type of research (Chan, A.P.C., 2004). The questionnaire was formed in the software product Google Form and distributed in the communities of various regional centres of Ukraine on the social network Facebook. Questionnaire analysis charts and tables are generated by using Microsoft Excel. The analysis of the results of the questionnaire was conducted in 2 stages. At first, we conducted an integrated assessment of memory acquisition and transmission between generations of different age groups. Presenting the results of the study graphically, we compared them with the normative vectors of memory transmission between generations. This allowed us to identify the points of the deviation of the curve. Only after that, an attempt to investigate the

source of such changes and identify priorities in the formation of the living environment was made. To do this, we used the method of comparison in pairs. The results of this comparison are structured by levels of design: subject-spatial, three-dimensional, and the level of the immediate environment (Fig. 1). These components of socialization are transmitted through the following institutions: preschools, family, school, various organizations, institutions of higher education, informal associations (Fig. 2).

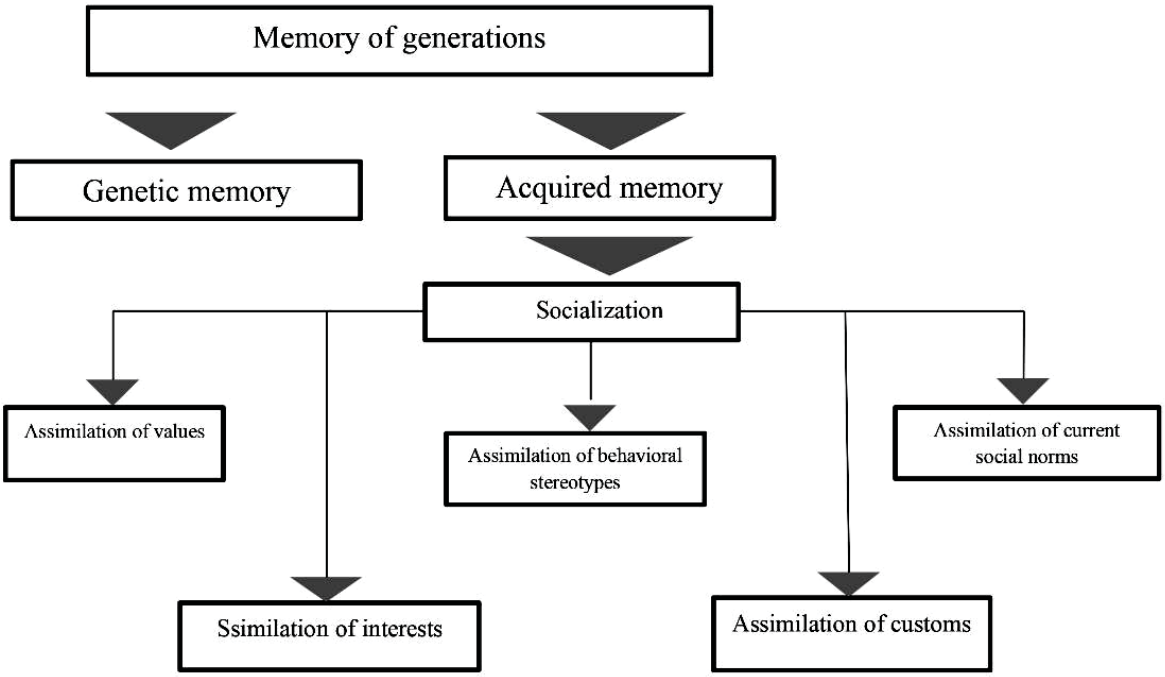

Fig. 1. The structure of the memory of generations (General course of sociology, 2018)

***Assimilation of interests**

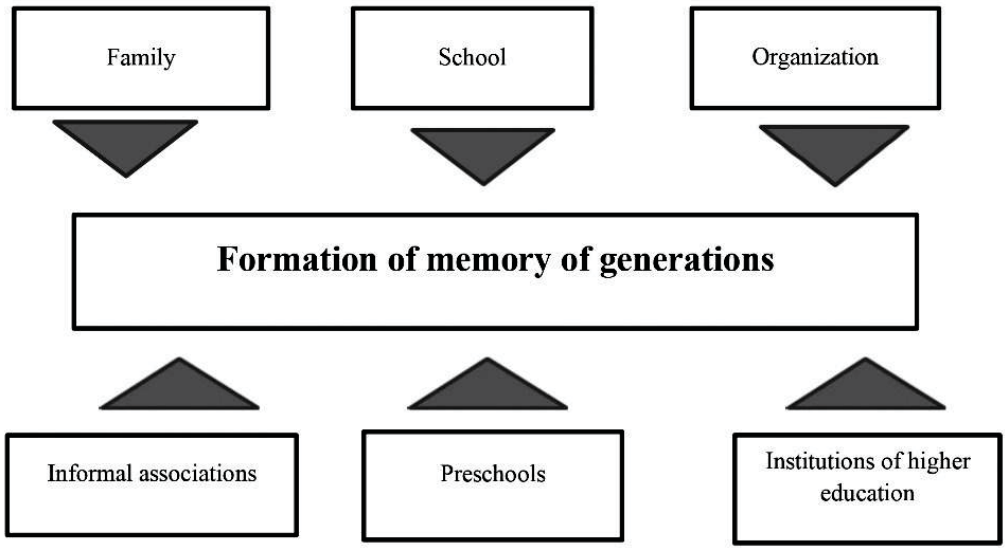

Fig. 2. Ways of transmitting the memory of generations (General course of sociology, 2018)

Our scientific interest is the process of transmission, assimilation and manifestation of the memory of generations in the process of changing the living environment. Gangi S., Talamo A. and many other scientists agree that the phenomenon of genetic memory transfer has been insufficiently studied, although they prove its

influence on all levels of human life. In this study, it can be claimed that genetic memory is manifested in all cases of changes in the living environment, but the weight of its impact on the elements of acquired values can be determined only by a detailed comparative analysis of sociological surveys of several generations within one family. According to the analysis of the structure of generational memory, the phenomenon *of generational memory in the formation of human habitat can be interpreted as conscious and genetic transmission, assimilation and manifestation of valuable and socio-behavioural characteristics of a man from one generation to another in the formation of the living environment.*

Along with this concept, scientists also study collective memory (Howard Schuman, Jacqueline Scott, 1989), as the assimilation of valuable socio-mental norms and rules of behaviour by a certain group of people who have common cultural characteristics. However, in this study, our scientific interest concerns the study of the manifestation of generational memory and genetic memory of an individual respondent, and the field of study that makes up the territory of Ukraine is very diversified in socio-cultural and historical aspects.

Based on the reference sources of practical sociology (the Basics of sampling in various types of studies, 2011) when conducting a social survey, we should pay special attention to the formation of questionnaires that reflect all levels of architectural design (Fig. 3).

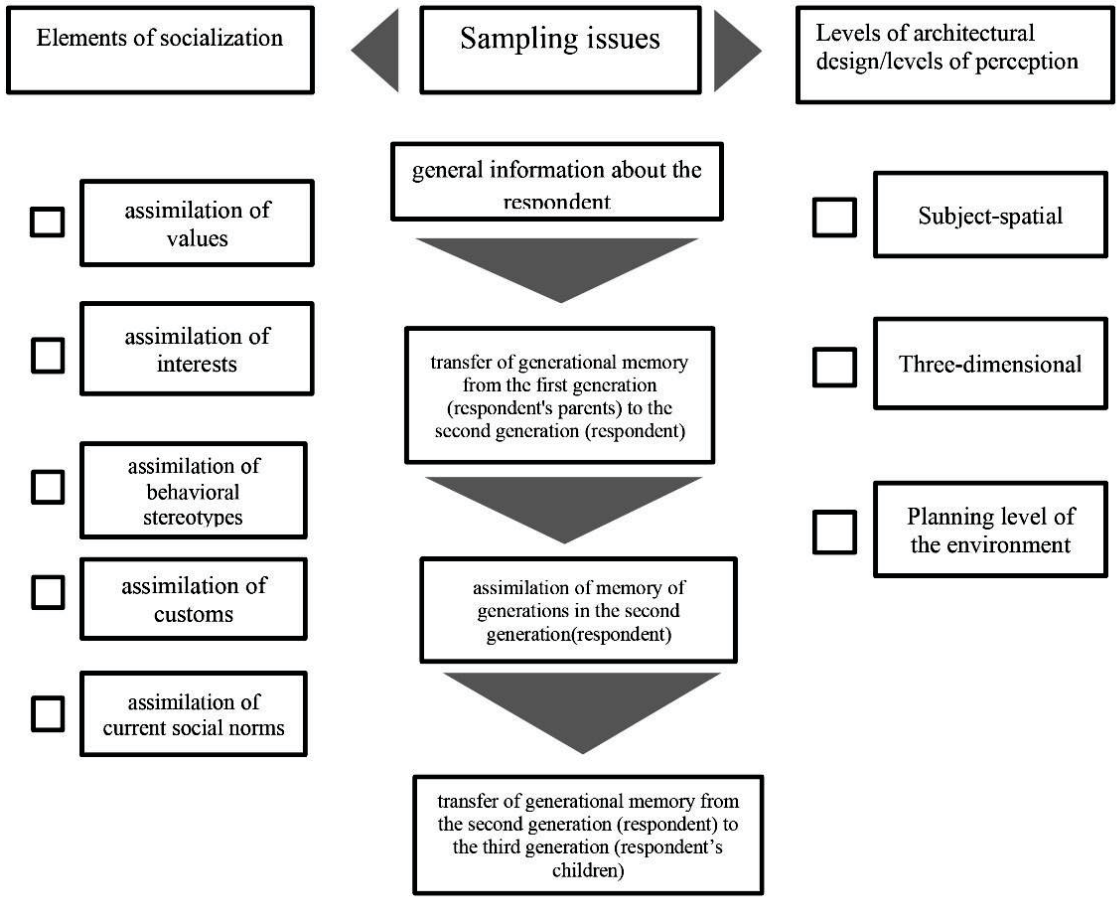

Fig. 3. The structure of the questionnaire of the sociological survey in the process of studying the manifestation of the memory of generations in the living environment formation (author's development)

The questionnaire, which includes 25 questions, was formed on the base of this model (Smadych I. P., 2020).

All questions are divided into several blocks:

– a general block of questions, including the general characteristics of the respondent (e.g. age, gender, income level, etc.).

– I block: the questions are focused on studying the ways of transmitting the memory of generations from the first generation (the respondent's parents) to the second generation (directly the respondent);

– II block: assimilation of generational memory in the second generation (the respondent);

– III block of questions: transfer of memory of generations from II generation (respondent) to III generation (the respondent's children);

This complex structure of the questionnaire allows both horizontal comparisons of the ways of transmission and the levels of the architectural environment, affected by the memory of generations, and "vertical" comparisons i.e. to compare living conditions between different generations.

Analysis of scientific sources for sociological surveys (Bernard S. Phillips, 1969) indicates the need for a multi-stage study of qualitative human characteristics. Accordingly, we conducted a pilot survey among 20 respondents who changed their dwelling at least 3 times during their lives. 2 additional questions were added to the questionnaire:

– What questions of this questionnaire were the most difficult and ambiguous for the choice of answers?

– What other questions would you add to this questionnaire?

The formation of behavioural stereotypes occurs in the period up to 15 years (Jean Mercer, 1985). The primary change of living environment most often occurs in 15 years (beginning of studies in universities or military service). That is why the initial countdown of the primary change of dwelling of the questionnaire takes place during this period. In the Soviet Union on the territory of Ukraine (until 1991) there was a housing policy based on the state support for working families. Therefore, people over 45 years did not have much impact on the first few changes in the dwelling, and the reasons for the changes were formed due to a natural desire to increase uncomfortably small living space of apartments (for example, typical apartment areas of that period: 1-room apartment – 31–33 m^2, 2 –room apartment – 30–46 $м^2$, 3-room apartment – 55–58 $м^2$) (Metspalu P., 2018).

To analyze the actual transmission and assimilation of generational memory between different age groups, a matrix of correspondence of the results of different age groups of respondents was created (Fig. 4), which will help to form schedules of assimilation and transmission of generational memory in residential architecture. Based on the information that the average age of mothers in Ukraine is 25 years (Chepelevska, L. A., 2018), all respondents are divided into the following age groups:

– up to 25 years (generation "A");

– 26–50 years (generation "B");

– 51 and above (generation "C").

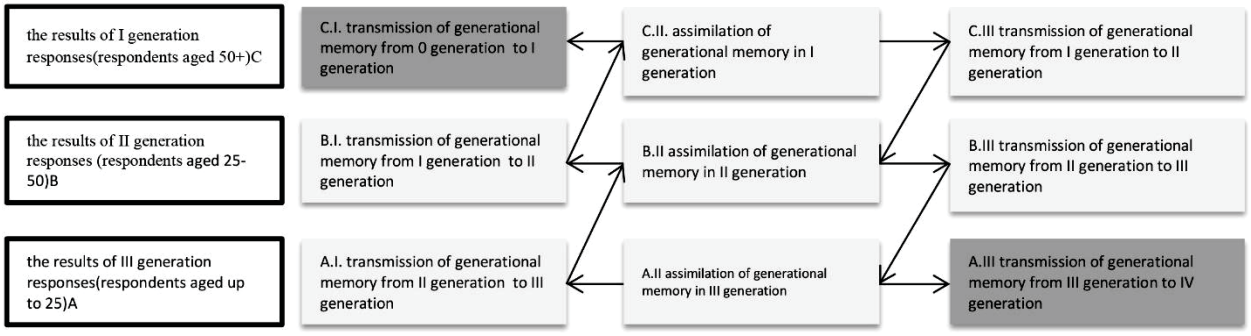

Fig. 4. Matrix of correspondence of transfer and assimilation of memory of generations to results of answers of various age groups of respondents (development of the author)

The consolidated matrix of results has the following form (Table 1):

Table 1

Matrix of comparison of answers of the main age groups of respondents (results of the author's analysis)

C.1	C.2	C.3	C.4	C.5
42.20 %	47.11 %	31.82 %	–	–
B.0	B.1	B.2	B.3	B.4
–	43.38 %	65.01 %	42.20 %	–
A.0	A.00	A.1	A.2	A.3
–	–	54.43 %	58.89 %	66.67 %

We used the grapho-analytical method for further analysis of the transfer and assimilation of the generational memory between groups A, B, C, (Fig. 5).

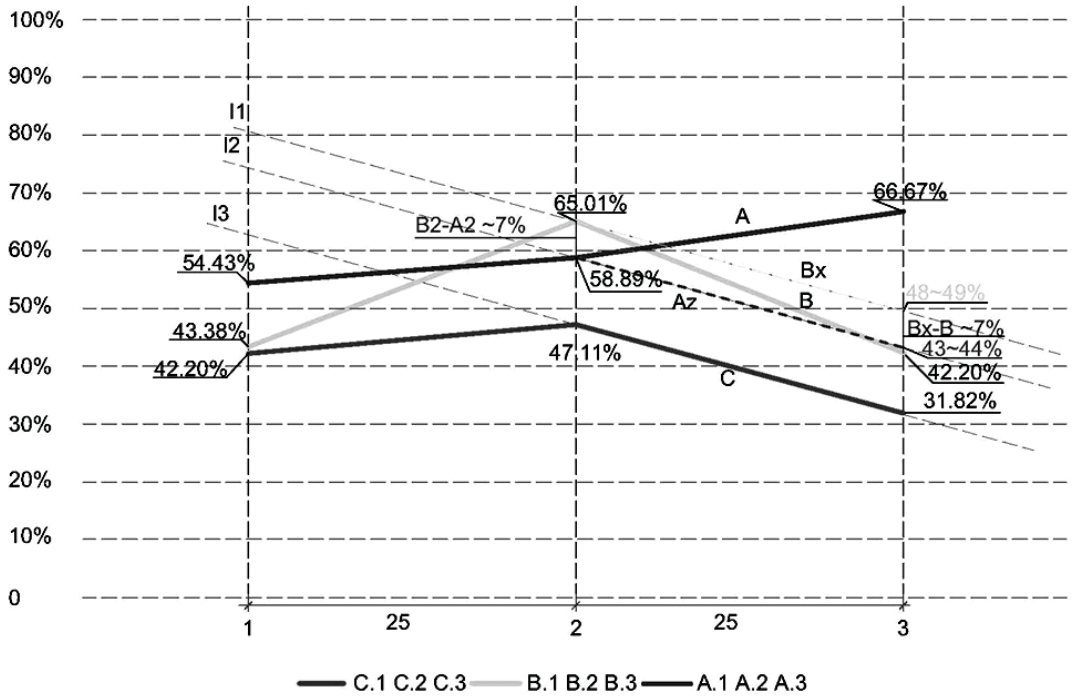

Fig. 5. Analytical diagram of the transfer and assimilation of memory of generations in the architecture of the living environment (author's research)

The horizontal scale of Figure 5 shows the age range of 50 years with 3 data fixation points (according to the developed matrix). Vertical scale – a scale of the quotient of positive responses of respondents of the appropriate age group (relative percentage units at 100 % maximum). Cristian Candia in his studies of short-term and long-term memory demonstrates that long-term memory has the form of a bi-exponential curve, which after a period of active growth in the first phase decreases in all subsequent phases (Candia, C., 2019). Also, any subsequent generation regardless of the level of memory transmission of generations from the previous age group (point 1) considers the level of its assimilation and interpretation in the home much higher (C1-C2, B1-B2, A1-A2). Thus, there is a relationship between the level of assimilation and the transmission of values to the next generation: the transfer of memory of generations (point 3) is always lower than the level of assimilation in this generation (point 2). We cannot determine the level of memory of generations in a specific period, because the results of the survey show only a certain period of 60–70 years. The percentage of the deviation of the curve conveys only the subjective assessment of the respondent, but the correlation between the answers in points 1, 2, 3 should be a constant dependence (this hypothesis is confirmed when comparing the deviation C1-C2 / A1-A2 and C2-C3 / B2-B3). Based on the nature of the existing graph of the bi-exponential curve and the transmission of generational memory to the oldest generations will always be higher than in all subsequent generations, so in our case line I3 (C2-C3) shows the best case of generational memory, which corresponds to the respondents' answers aged 50+. When applying the baseline I3 on the section of the deviation B2-B3, there is a decrease in the normatively defined memory transfer of generations by 7 units (Bx-B). The same difference is in point 2 of the assimilation of the memory of generations by people under 25 years (B2-A2). We cannot say for sure that this feature works for all cases in a period longer than the study. But in this study, it can be assumed that the number of conventional units of memory of generation X, which for one reason or another was not transferred during the upbringing to the next generation X+1 will not be assimilated. The analysis of this graph shows that respondents of age group A want to pass on to their children the traditions of housekeeping or housing at 67 conventional percentage units, but the actual transfer rate will be 43–44 units.

In the second stage of the study, we aimed to investigate the reason for the decrease in the quotient of memory transfer from generation B to generation A by 7 units. To do this, we separated the results of statistical studies and conducted a group comparison where we compared the results of the responses in groups B with the responses of groups A and C. (Smadych I. 2020/II)

Comparison of the main results of the study allows us to trace the reasons for the reducing of memory transmission from generation B to generation A in the context of the formation of the living environment, as well as to identify tendencies in housing needs in Ukraine. Using the group comparison method, we identified some questions where Group B had the lowest response compared to other groups and tried to describe the possible causes of such cases and suggested ways to improve these components of generational memory in residential architecture.

The analysis of the answers of the main groups of respondents regarding interior items, that are associated with the first home of the respondent, in group A shows 80 % of respondents have such interior items. In group B, only 52 % have such items. However, in group C, 76 % of respondents have such interior items. Also in group B, the manifestation of fashion trends in the interior is much higher than in other groups of respondents 72 % to 43–46 % in other groups A and C (Table 2).

Architectural and design objects

Table 2

Summary analysis of answers to the question "Are there things in your current home that are associated with your first home?"

Group of respondents	Proportion of results for each group	Possible reasons	Ways to improvement
A (0-25)	80 %	The desire to follow the fashion world trend in interior design	Popularization of Ukrainian folk motifs or old things in interior design as an element of passing on the memory of generations
B (25-50)	52 %		
C (50+)	76 %		

Spatial elements

40 % of respondents under the age of 25 want to return to their first living conditions. However, at the age of 25–50 this quotient is only 20.4 %, and at the age of 50 – 34.2 %, 52 % of people in group A consider the ability to find a job as one of the priorities in housing planning. In other age groups of respondents, this quotient is less than 34 %. There is a change in employment trends, the appearance of remote work (Ukraine is on the 4th place in the world in the quotient of remote employees (Tertychnyy O. O., 2016), a new approach to housing planning is needed, where special attention should be paid to job placement, which may involve small private space or a separate room (Table 3).

Table 3

Summary analysis of answers to the question "What were your priorities when choosing a new home?"

Group of respondents	Proportion of results for each group	Possible reasons	Ways to improvement
A (0-25)	40 %	Priority of proximity of the workplace to the dwelling.	When designing residential buildings, it is necessary to include a separate office place or a separate area for the organization of the workplace.
B (25-50)	20,4 %		
C (50+)	34 %		

External environment

79.5 % of the population from small settlements in subsequent housing changes consider one of the priorities of living near nature or the outskirts of the settlement (although the total quotient of these responses to the survey is 63–65 %). However, selective communication with some respondents does not indicate the reasons for such a choice, so we can assume that these preferences for future residence are a manifestation of both acquired and genetic memory. Also at this age, there is a lower quotient of the manifestation of the memory of generations at the subject-spatial level. Comparing these results with the results of housing change priorities, we see the following answers: at the age of 25–50, the main ones are proximity to the workplace and good transport infrastructure conditions (70 % of answers), with a constant quotient of this priority for other age groups within 45–55 %. These results demonstrate the need to apply a qualitatively different approach to the zoning of cities in Ukraine, focusing on integrated solutions for multifunctional zoning of residential, public, social and industrial areas of environmentally friendly production, located in a single area of the city. The planning approach, which was formed during the industrialization of the twentieth century, focused on a clear demarcation of industrial and residential areas of the city in different parts of the city with buffer zones up to 1.5 km. However, the further development of the city planning system on this principle increases the loading on the transport network during rush hours and creates a transport collapse (Table 4).

Table 4

Summary analysis of answers to the question "In what place (or part of the settlement) would you like to live?"

Group of respondents	Proportion of results for each group	Possible reasons	Ways of improvement
A (0-25)	63 %	Preserving the memory of generations in relation to the original environment	Application of approaches to the planning system of the settlement, with equal placement of different zones on the whole area of the settlement without loss of logistics quality; formation of housing-complexes of a new type, which will include various functions and will be able to use the labor of the inhabitants of these houses;
B (25-50)	79,5 %		
C (50+)	65 %		

The comparison in groups allowed us to determine the reasons that affect the decrease in memory transfer of generations from generation B to generation A. We also managed to form a tool to improve this problem through the use of specific architectural techniques in the design of residential architecture at different levels and the formation of housing policy in settlements.

Conclusion

Peculiarities of the first human dwelling have a direct impact on all other cases of housing change through conscious or unconscious attempts to reproduce or interpret the elements of his first home that are valuable to him; the specific case of the level of memory transmission of generations has a direct impact on all subsequent generations.

As a result of the study, it was determined that the memory of generations and genetic memory are preserved throughout human life and in one form or another have an impact on the formation of the living environment. *Accordingly, the first hypothesis is confirmed.*

It has been determined that the change of values and active functional orientations related to the need of financial enrichment or career growth of a person aged 25–50 reduce the manifestation of the memory of generations in the interior and exterior of his home. At the same time, the manifestation of traditions, interests

and customs in the interior of the home returns in old age, when the ability to work decreases. Thus, the second hypothesis is partly confirmed.

There are strong mental connections between different generations, but their manifestation in architecture can be fragmentary throughout life. The obtained results indicate that the 3rd hypothesis is confirmed.

After analyzing the results of the survey, the differences are observed there are forms of the memory interpretation of generations in interior items, which may not always be authentic objects of previous housing, but have the same semantic character. At the same time, there is a people's desire to change their forms of work with the opportunity to spend more time with their families. The real estate market of Ukraine is not adapted to global trends of remote work or self-employment. There is an urgent need for scientific and practical advice on changing the planning system of certain housing units to include separate areas or premises for permanent or periodic work. At the three-dimensional level of design, the desire to create workplaces near the immediate housing can be realized through the formation of multifunctional buildings, as a new type of residential architecture, which is actively developing in the world. There is a need to popularize and find forms of interpretation of traditional interior motifs in the modern context, as a method of preserving the culture of previous generations. We also see the need for further research on this phenomenon of generational memory in the context of the search of architectural techniques for the formation of the living environment, which have a decisive influence on the socio-mental characteristics of a man.

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ВПЛИВ ГЕНЕТИЧНОЇ ПАМ'ЯТІ ТА ПАМ'ЯТІ ПОКОЛІНЬ НА ЗМІНУ ЖИТЛОВОГО СЕРЕДОВИЩА

Анотація. *В цій статті розглянуто феномен пам'яті поколінь та його вплив на людину при зміні житлових умов. Пам'ять поколінь в архітектурі – це міждисциплінарне поняття, що трактується, як передача системи знань, норм і цінностей, соціального досвіду, соціальних якостей, ролей та поведінки від одного покоління до іншого, та проявляється у всіх сферах життя людини, в тому числі при формуванні та виборі житла та житлового середовища. Реалізація цих компонентів досягається шляхом виховання людини в сім'ї та соціумі, а також частково на генетичному рівні*

(генетична пам'ять). В результаті теоретичних досліджень поняття "пам'ять поколінь" сформовані основні гіпотези цього дослідження, що охоплюють кілька аспектів: пам'ять поколінь має вплив на вибір житлового середовища при зміні місця проживання; існують сталі взаємозалежності між рівнем передачі ціннісних орієнтирів різних поколінь; при підвищенні рівня функціональних пріоритетів людини знижується рівень подібності житла, яке було притаманне різним поколінням.

Для проведення цього комплексного дослідження використано метод соціологічного опитування, графоаналітичної оцінки та групового порівняння. Питання опитування відображають основні складові феномену пам'яті поколінь: засвоєння ціннісних орієнтирів, засвоєння стереотипів поведінки, засвоєння діючих соціальних норм, засвоєння звичаїв, засвоєння інтересів. Серед 210 респондентів, що пройшли це опитування в соціальних мережах, основна частка 99 % становлять жителі України. З них 82 % респондентів змінювали житло понад 3 рази.

Визначено, що пам'ять поколінь втрачається при активізації функціональних орієнтирів (зміна житла в процесі зміни місця праці, бажання покращити умови проживання через наслідування модних тенденцій в архітектурі. Проте цей феномен проявляється в старшому віці (50–65 років при наступних змінах житлового середовища). визначивши причини, що вплинули на зниження рівня подібності в житлі різних вікових груп, ми сформували пропозиції елементів архітектурно-планувальних та просторових рішень. Це допоможе виправити негативні тенденції міграційних процесів в сільській місцевості України, а також змінити підхід до уніфікованої системи житлового будівництва на систему адресного будівництва відносно потреб людини та її життєвих пріоритетів.

Ключові слова: *пам'ять поколінь в архітектурі, житлове середовище, ціннісні орієнтири при виборі житла, житлове середовище людини.*

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PROSPECTIVE TRENDS OF MULTIFLAT HOUSING IN 2021–2035

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Abstract. The article presents an analytical review of promising trends in apartment housing for the next 15 years. In particular, the following trends have been identified: increasing the role of energy efficiency, reducing housing stories, increasing dwelling diversity, increasing the role of environmental and ethical factors in diversifying housing management, modernization, cooperative building retrieval, appearance housing policy.

Key words: energy efficiency, modernization, probability, diversity, trend, housing.

Problem statement

Nowadays, there is an active building process in some regions, less active in others, in some – stagnation. Such cities as Kyiv, Lviv, Odesa, Dnipro, Kharkiv have a lot of building sites, and they determine the general trends of multi-apartment housing. The situation is slowly changing, and the housing estate market is becoming a consumer market. Part of single-family houses is constantly and slowly growing. A product of high-quality will correspond to consumers requirements and provide successful competition in the housing estate market.

Existing and future trends are necessary to take into account for the creation of a competitive product. Quality of housing built in Ukraine over the past 25 years is significantly worse than in European countries, that is why it is necessary to analyze European experience for determining these trends. European experience can be cliched, but not completely because it is quite difficult and inappropriate.

Trends are a temporary thing, so it is necessary to identify the most important, which will be relevant for the next 10–20 years. They should contribute to improving the quality of housing and living comfort. A significant part of the trends can be named analyzing the European experience, considering the time lag in technology. The trends analyzed will fit most segments of apartment housing. Few of them are already presented in some segments, but usually, there are more exceptions to the rules rather than the rules. Regardless of the nature of the assumption, forecasting trends are significant because they enhance theoretical and design-analytical work. The design-search process is largely determined by this, too.

The identified trends may be caused by various external factors – economic, social, technological, environmental, political, etc. or a combination of these factors. They affect various aspects of architectural and

design activities – artistic, aesthetic spatial planning, technical and economic, etc. Trends can also reinforce or reduce each other or be independent.

Analysis of recent research and publications

The topicality of the article is proved by a lot of articles and publications. The following publications are devoted to the study of this topic: "Current trends in the development of the primary residential real estate market in Kyiv" (R. Herasymchuk, 2014), "Current trends in the design of multi-apartment commercial housing in Ukraine" (J. Yuryk, 2010), "General directions of evolution of spatial planning structure of apartments in Ukraine" (V. Ursatiy, 2009), "Storeys impact of residents health", (Hnes I., 2009), etc.

The main emphasis of published works is directed on spatial planning regulation without specification of time frames. There are profound scientists' works, where each of the researched trends are analyzed in detail, but there is a lack of a brief analytical review of this topic in the form of an article. The article represents the author's vision in the form of observations, assumptions, hypotheses, which differs from other studies. It is essential to note that an extensive context is analyzed, including various aspects of housing policy.

Objective of the article

The article aims to identify future trends in apartment housing for the next 15–20 years, find out the factors that determine these trends, predict the impact of these trends on housing policy.

Results and discussion

Flat or houses selling becomes a more difficult business today because competition intensifies and demand for housing slowly increases. It is necessary to take into account the trends and tastes of apartment buyers to ensure competitive advantages. The article presents 10 perspective trends during the next 15 years, which is the longest time frame of pragmatic forecasting.

1. Energy efficiency. The energy efficiency of new housing is significantly better compared to the housing that was built between the 1960s and 1990s. However, if we compare the houses with modern European or American ones, heat losses per square meter are 2–4 times higher. The cost of reducing each next unit of heat is bigger than earlier and requires more investment.

To reduce energy consumption for heating during the year per square meter from 100 kW*h to 50 kW*h we spent practically the same cost as to reduce from 50 kW*h to 30 kW*h. Reduction of energy consumption in the first and second cases differs 2.5 times (O. Denys, 2009). Developers and designers offer the most cost-efficiency solutions: effective thermal insulation of external walls using more efficient boilers or other heat devices, etc. Because of this actual consumption significantly may be beyond the standards. These factors can reduce the standards of consumption:

- significantly higher air temperatures than standard during the heating season;
- heat measure for every apartment;
- energy savings due to the increase of its price.

Indoor indoor temperature during the day can range from 14–16 °C without people and 17–20 °C when they are, and the average value will be 17 °C, which is less than the standard temperature of 18–20 °C (S. Zhukovskiy, 2000). Better external thermal insulation will reduce the duration of the heated period for 1–2 weeks, as well as global warming (rp5, 2015), (green-city.su, 2019). Real energy consumption can be 10–20 % lower due to indirect energy-saving measures only. The potential even cheap energy-saving measures are not fully used:

- LED bulbs are not a new standard, but they are 7–10 times more efficient than candescent bulbs and 2–3 times more fluorescent one;
- the thickness of thermal insulation is rarely more than standard, a lot of cold bridges;
- heating systems with efficient heat distribution are almost absent, first of all, wall or floor surfaces heating systems.

People's changing of consciousness often determines more energy efficient use than fine or standards. We can predict that over the next 5–10–20 years, depending on economic agenda and energy prices, energy efficiency indicators for housing buyers will be much more significant than today.

2. Reducing housing storeys. There is a trend to gradually reduce the number of storeys of new housing. However, the situation is not the same in Ukraine. In Kyiv, for example, the number of storeys are decreasing while in Lviv it is gradually increasing. The author considers that these cities are still in different periods. Kyiv has already passed its peak of storeys, Lviv – is slowly reaching it. Many studies confirm the increase of operation costs with increasing building height and harm to human health, too (I. Hnes, 2009). Therefore, the trend height of decreasing is predicted, and will occur for the following reasons:

- demand decreasing for housing in most towns & cities of Ukraine due to population decline except a few big cities and capital;
- demand reduction due to the accelerated immigration 2021–2030;
- ess money flow of abroad employers into the real estate market (single-family housing part), especially due to virus threats;
- development of a participative and cooperative private detached and townhouses building as an alternative to multi-apartment housing.

3. Increasing the diversity of the real estate market. Diversification process in the sphere of apartment housing slowly developed today. In time, the process can accelerate. Majority of new apartment housing in the 2000s was an improved version of the Soviet housing, except for business class or luxury housing. More modern apartment dwelling of economy-class appeared in 2009-2010 already. Comfort-class housing emerged in 2011–2013 (R. Herasymchuk, 2014). This housing differs from average residential buildings of the previous period primarily by thoughtful design, quality of materials, context-oriented planning, architectural expressiveness.

Flat areas in such housing can be even smaller than the average, often corresponding to economy-class. At the same time, such residential complexes often morphologically include different typologies: townhouses, sectional, blocked in two levels, gallery, atrium and hybrids of these.

Townhouses will be developed also, nevertheless, the share of the type is not more than 1 % today. This type of housing is the most attractive for medium-sized cities with a population of 50–200 thousand because it offers much better opportunities for living compared to apartment buildings. The advantages of this type are own plot of land, entrance from the ground, individual heating and water supply, own roof and cellar. At the same time, the density of townhouses is 3 -5 times higher than single-family houses and allow for public transport in the vicinity of 4–6-storey buildings.

4. The growth of ecological factors. Housing buyers before buying a home think about the environmental friendliness of the materials from which it was built. Harmful for health building materials are used in housing construction very often. There are questions about their quantity and method of using. Practically no building is built without heat-insulating fibrous materials, foams and other artificial non-environmental substances. Many houses can be called truly ecological, but these are mostly single-family homes, but very few are multi-flats buildings.

More ecological buildings likely appear in the next 10–15–20 years. The buildings based on a wooden frame will have walls of straw or reed blocks. Wood and other natural materials will be popular as concrete and brick today. This type of housing is not only more environmentally friendly but also cheaper. Modern synthetic insulation will be gradually replaced by organic based on cellulose, flax, seaweed, coconut fibre and others. It will come true not earlier than in 2030–2035 because the economic situation will not change very quickly.

5. Accelerating the growth of the share of "bad" and emergency housing. Average housing square per capita will increase no more than 0.15–0.25 m^2/year. An average need will be 28–30 m^2/person, and comfort level will be 35–40 m^2/person, which corresponds to the average European indicators (k. Day, 2000). The level can be achieved in 70–100 years, according to new square meters per year. Existed housing destruction speed is practically the same. A big part of housing is obsolete, emergency or unfit for habitation. In a future decade, the

speed of destruction of abandoned, obsolete and emergency residential buildings will be faster than new buildings according to the majority of economic forecasts.

6 Aesthetic and architectural factors importance growing. This trend is more difficult to predict than all the above. Buyers of housing, especially in the comfort class segment have some requirement of the architectural aesthetic of the building, which they want to buy. A requirement for building appearance is quite difficult to accurately formulate, but most of them will include the following criteria:

- scale to the surrounding buildings and people, the harmony of form and spatial structure;
- adequacy with the location, corresponding to the natural or anthropogenic landscape;
- the presence of greenery on the facade – pots with bushes or flowers, vertical green elements
- using not too bright and dim colours, presence of details;
- individual character and silhouette of the building;
- use of high-quality and durable materials that can grow old with beauty;
- absence of large mirror or deaf surfaces of wood, stone, plaster, etc.

These criteria are close to organic architecture spirit, some of them we can find in Kristofer Day's famous work "The place where the soul lives" (Day K., 2000). The criteria can also relate to the style, shape of the roof, windows or balconies, etc.

7. Housing management forms diversification. Today, more than 92 % of housing is owned by citizens. A big part of the housing has bad or even unsatisfactory conditions. Due to this, housing management methods become social determinants. 5 forms of housing management are predicted.

External management. Some of the people with low-income who cannot maintain their housing in good condition will use some financial support from the state or private initiative. Their rights for living, owning or rent will be restricted for exchange for financial support. This form will be popular for small houses with 5–10 apartments or larger with a relatively homogeneous population.

Club housing and condominiums. The target segment of the category is wealthy people that want to have housing that corresponds criteria's of comfort and status. It differs from the other types by developed infrastructure services and high payments. Besides, residents also receive certain benefits of using such infrastructure. Owners of flats in the housing can select candidates for living or owning here.

Association of co-owners of apartment buildings. This form will be the most popular, among inactive and passive citizens, who will transfer management of housing from communal to private entities. This type of management will be popular in a residential building from 20 to 200 and more flats.

Housing cooperatives. This form can be renewed as an active housing management type. This form of housing management will unite enterprising citizens. Residents will decide when and what needs to be repaired, hire security or cleaners, clean the area from snow and other questions. Share management of the adjacent territory of basements or other communal spaces can bring profit and differ it from other forms of management.

Reserve housing. This type can be formed only after the building boom. This housing can use and own communal, public or private corporations but not a private person. This is the type of housing as a temporary place for living for citizens in difficult psychological, social and legal situations.

8. Housing modernization. High prices for utilities and reduced subsidies will stimulate the housing modernization and the process may begin after 2020. Separate modernization programs can start in the next 3–5 years. However, as a sustainable process, housing modernization will start in 2020/2030s. Funds for modernization will have several sources – cost of residents (30–50 %) city cost, grant or patronage funds, support or credit. This process first of all will affect condominiums and communal housing. The duration in time can be at least 10–15 years, but probably even 20–30 years, until 2050. The dwelling modernization process will be paid only by residents without any additional help.

9. Cooperative building retrieval. Today, there are only two forms of a building – own ones and buildings firms. Housing cooperatives have been known since the first half of the 19th century and are very developed in Germany and other European countries (zn.ua, 2012). Nonprofit multi-flats housing is practically

absent today in Ukraine. First of all, the ecological builders cooperative can arise and develop. Such cooperatives can be headed by builders, architects or people of other professions who have practical building experience. The movement can also play the role of consulting, coordination, and information service.

10 Housing policy appearance as an important tool for socio-economic development. Housing policy in Ukraine is present as a declaration, but there are almost no hypothec, residential credits, or dwelling buildings by state cost. There is no clear vision of the housing policy role in the state-building process and social progress among government and other leaders. Only building codes are corrected with a significant time delay at the state level.

At least 3–5 million families or 10 million citizens need better housing conditions in Ukraine. The building of new housing and reconstruction can become one of the country's economic locomotive. Unlike other branches, first of all, the construction industry needs organizational transformations. This is because the vast majority of building materials and components are manufacturing in Ukraine. Construction technologies for housing buildings in most cases are not too complicated. The development of the construction industry gives a multiplier effect about 2–3–5 times. A clear and understandable housing policy quality will be an effective tool for socio-economic development in the future in 10–15 years. The basis of which will be the creation of conditions for the better quality of new housing.

Conclusions

1. The development of apartment housing in the process of its evolution is studied. The author determinates ten perspective trends: increasing energy efficiency, storeys reducing, increasing diversity, environmental and ethical factors increasing in choosing housing, diversifying housing management, housing modernization, cooperative building restoration (retrieval), the housing policy emergence as an important tool for socio-economic development.
2. These trends may occur earlier or later than the specified period, depending mainly on the economic agenda. The forecast of trends based on analysis of Ukrainian and European housing development over the past 25 years.
3. Taking into account these trends will help to improve the consumer quality of housing,
4. There is a need for more precision analysis of apartment housing for more accurate prediction of the apartment's development trends for the next 15 years.

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ПЕРСПЕКТИВНІ ТЕНДЕНЦІЇ РОЗВИТКУ БАГАТОКВАРТИРНОГО ЖИТЛА 2021–2035

Анотація. *У статті представлено аналітичний огляд перспективних тенденцій багатоквартирного житла на наступні 15 років. Ці тенденції прогнозуються на основі аналізу міжнародного досвіду, зокрема країн Європи. Прогноз загалом ґрунтується на поточній економічній ситуації та демографічних тенденціях в Україні. Найбільш ймовірним трендом є зростання ролі енергоефективності в оцінці споживчих характеристик житла. Існує великий вітчизняний та зарубіжний досвід застосування засобів енергозбереження.*

Зменшення поверховості також є доволі прогнозованою, оскільки 3–5 поверхова забудова може мати щільність співставну з 8–9 поверховою забудовою. Малоповерхова забудова має багато якісних переваг. Передбачається збільшення різноманітності квартир що відповідатиме у різним життєвим укладам покупців. Ця тенденція зараз перебуває на початковому етапі. Екологічність матеріалів стає вагомим чинником при виборі житла, оскільки це безпосередньо впливає на якість життя. Якість проживання поступово ставатиме найголовнішим критерієм при купівлі нерухомості, а не кількість метрів квадратних як в минулому.

Однією з негативних на найбільш ймовірно прогнозованих тенденцій є зростання частки аварійного та малопридатного житла для проживання. Цей проноз ґрунтується на зношеності інфраструктури, негативним демографічним та економічним трендам. Передбачається також зростання важливості художньо-естетичного чинника. Однак ймовірність такого розвитку ситуації є меншою, ніж вищезазначених трендах. Урізноманітнення форм управління житлом може стати однією з форм ефективнішого та якіснішого використання житлового фонду.

Модернізація житлового фонду є одним з найважливіших та прогнозованіших трендів на наступні 15–30 років. Ця тенденція триватиме навіть до 2050 року. Відновлення кооперативного будівництва також є однією з менш прогнозованих, оскільки процес кооперації вимагає активного залучення. Поява житлової політики, як вагомого інструменту соціально-економічного розвитку може стати вагомим інструментом розвитку житлового будівництва.

Ключові слова: *енергоефективність, модернізація, ймовірність, різноманітність, тенденція, житло.*

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CURRENT SITUATION AND CONSERVATION ISSUES OF THE CEMETERY NEAR THE CHURCH OF THE HOLY SPIRIT IN ROHATYN

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Abstract. The historical cemetery near the Church of the Holy Spirit in Rohatyn was investigated. The analysis of damages and losses of the ensemble of the cemetery and its separate monuments is carried out. The material of tombstones has been identified, the state of preservation of their physical substance has been analyzed. Tasks and challenges related to the conservation of the cemetery as a whole and its monuments have been analyzed.

Key words: historical cemetery, memorial sculpture, stone, preservation, conservation, architecture.

Problem statement

Rohatyn is an ancient and historic town. It is famous for its historical, cultural and architectural monuments. Historic cemeteries, as well as churches, are an integral part of the cultural landscape of every city and town. For Ukrainians, the church itself is extremely important – it is a demonstration, a material embodiment of the spiritual essence of Christianity. The area around each Christian church was also called a "cemetery". In ancient times, Christians were buried around churches, as well as in church crypts. Both the church and the cemetery are a valuable source of historical information, as well as a unique, original gallery of works of art. Unfortunately, historic cemeteries are very vulnerable to destruction – they are physical, chemical and biological factors, as well as human factors, such as ordinary vandalism or incompetence in carrying out repair or finishing work. To successfully create and implement a program for the preservation and conservation of historic cemeteries, it is necessary to carefully research, document and study the material from which these monuments were made.

Analysis of recent research and publications

The historical cemeteries of Ukraine in general and Galicia, in particular, are poorly studied. Mostly researches highlighted the history of the cemetery and described the prominent people buried in these cemeteries. Usually, it is about famous cemeteries in large cities. The issue of memorial sculpture, both professional and folk, in their works to some extent raised by researchers such as Mozdyr M., Mohytych I., Krypyakevych I, Dorosh A., Odrekhivsky R., Prysyazhny K., Biryulyov Y. and others. M. Dolynska, A. Chemerchynsky, P. Grankin, H. Kharchuk, A. Partridge, and others, who study the issues of Galician historical cemeteries.

Objective of the article

The study set the aims to examine the current state of the historic cemetery near the Church of the Holy Spirit in Rohatyn. Investigate material, in particular stone, of the memorial plastics of the cemetery, analyze the causes of its destruction and damages. Show challenges and tasks related to the conservation and preservation of this object.

Results and discussions

Rohatyn is an ancient city because archaeologists have found objects from the Paleolithic and Bronze Ages. In the tenth century, the territory of Rohatyn was part of Kievan Rus. In the vicinity of the city, archaeologists have discovered settlements dating from the tenth to thirteenth centuries with the remains of ramparts, residential buildings and even the foundations of the church. In 1415 Rohatyn was granted the Magdeburg right, and its rapid development began (Wortman D., 2012, p. 248).

It is probably at this time that the wooden Church of the Descent of the Holy Spirit was built. The church is one of the oldest wooden churches in the Carpathians, which has survived to this day. Scientific sources date the church to 1546 (Brykowsli, 1995, s. 76, 90), 1598 (Slobodian V., 2004, p. 81) or the first half of the seventeenth century (Drahan, 1937, s. 76). Recent research shifts the date the church was built to the late 15th. Century (Kutnyi, 2009, c. 101). Initially, the church did not have a bell tower. That is, the bell tower stood separately and was delivered to the church around 1675. In its history, the church has been renovated several times. In particular, in 1675, 1895, 1912. It was in 1912 that the tops of the church were rebuilt – from Baroque with breakers to straight conical, that we see now (Fig. 1).

Fig. 1. View of the church and the cemetery from the south side

In 1963, the Holy Spirit Church was included in the State Register of Architectural Monuments of National Importance under protection number 243. (Zavada V., 2000, p. 67). In 1980-82, the monument underwent thorough restoration work under the direction of architect Ivan Mohytych Since 1983, the Church of the Descent of the Holy Spirit in Rohatyn has been a museum object – a department (now a branch) of the Ivano-Frankivsk Art Museum. In 2013, the Church of the Holy Spirit, along with other wooden churches in the Carpathian region, was included in the UNESCO World Heritage List. The area of property included in the World Heritage List is 0,49 hectares (Lipska, Swiatkowski, Warchol, Fichuk, Somochkin, 2014, s. 14). Its borders on three sides run along the existing fence on Drahomanov and Staromlynska streets, and from the west along the Gnyla Lypa river. The south-western part of the border turns north along the ancient border of the cemetery without reaching the river. In the centre of the territory, which is included in the World Heritage List, on a hill is located a church. The church is surrounded on three sides by a cemetery. Only on the south side of the church, in front of the entrance, there is a small square with a flower bed, benches and a security booth. The northwestern part of the cemetery is located on the slopes of the hill and at its foot.

The area of the buffer zone is 1.47 hectares and includes the territory of the city around the World Heritage property (Lipska, Swiatkowski, Warchol, Fichuk, Somochkin, 2014, s. 16). The boundaries are defined taking into account ownership issues along existing roads. Most of the buffer zone is built up by single-family houses. Only the north-western part of the zone, which includes the river, its banks and meadows remain undeveloped. The defined buffer zone also takes into account all important views to and from the object.

The historical boundaries of the cemetery have remained unchanged. From the west, the natural border is the river Gnila Lypa. From the north, south and east – the roads that surround the hill. The cemetery near the church was gradually filled. The oldest is the south-eastern part of the cemetery. The most deserving members of the community were buried here as priests, members of the church fraternity, etc. Here are the most prominent, the largest and the richest of artistic decoration of the tombstone. Such as the figure of St. Nicholas or the Virgin (Fig. 2, 3). Most of these monuments are made of limestone. However, it is here that you can find several monuments made of sandstone. These are the only monuments in the cemetery made of this material. It is worth noting that both the figures have the character of monuments made by professional masters.

In this oldest part, there are also crosses dating from the first half of the XIX century. In the Ukrainian ethnic lands for centuries until the 19-century crosses were the main form of the tombstone sign in the town cemeteries (Mozdur M., 2009, p. 26–29). It is not known when the carved figured components first appeared on the cross, but the order was always as follows – first just a cross, then a cross with inscriptions and solar signs, then a cross with a crucifix, then a cross with a crucifix and the upcoming ones, and then various combinations to decorate the composition with additional elements such as flowers, leaves, towels, angels, additional figures of saints and so on. In Rohatyn, these are three-leafed crosses of the Greek type. Their height is about 80 cm and a width of about 60 cm, and the thickness varies from 16 to 19 cm. The ends of the arms of the cross resemble clover leaves. The triple clover leaves are a symbol of the Trinity. These ancient crosses contain only inscriptions. This text occupies the entire surface of the cross, sometimes on two sides. Stone crosses made of limestone are a light grey, slightly yellowish stone. These crosses have a small rectangular stone base. They stand directly on earthen graves. Some of the crosses bent, some fell, and some sank into the ground (Fig. 4, 5).

In the second half of the XIX century, the cemetery grew to the north, filling the space behind the church along the fence. In this part of the cemetery, we can also see many stone three-leaf crosses of the Greek type, the same as in the oldest part. There are also crosses with crucifixes here. A feature of the cemetery in Rohatyn is the technique of making these crosses – it is a deep relief which is a pattern cut into the surface. This relief is very thin and very delicate. This image creates the illusion of volume due to the play of light and shadow. In addition to the crucifix, we can see here the three-leafed crosses decorated with a figure of the Virgin, made in the same technique of deep relief. These crosses are also made of limestone (Fig. 6, 7).

Fig. 2. Tombstone with the figure of St. Nicholas

Fig. 3. Tombstone with the figure of the Virgin

Fig. 4. Three-leaf crosses of the Greek type on the oldest part of the cemetery

Fig. 5. Cross with the inscription of 1869 which fell and lies on the ground

In this part of the cemetery, we can already see crosses made of artificial stone – such as reinforced concrete and so-called lastriko. Often the grave itself is already fenced with a cement curb. Such monuments are often in the shape of a slab, very often have metal plates and are often decorated with photographs made on a ceramic basis. Colouristically, they are sustained in greyish colours. Sometimes delicately decorated with a ribbon of geometric ornament in black, white and grey. A few metal tombstones made in the technique of casting. These are extremely monumental statues – one of them is just a cross made in the neo-Gothic style. The most notable is the crucifix with the figure of the Mother of God standing under the cross. There are several smaller crosses that, unfortunately, are broken and destroyed. All metal monuments were placed on stone foundations. The metal is in very poor condition.

In the early twentieth century, the cemetery grew in a northwestern direction on a hillside toward the river valley. We can say that the lower terrace of the cemetery was formed. And actually, here the territorial growth of a cemetery stops. Here you can also find some ancient, already familiar to us stone three-leaf crosses – very few of them. Here you can also find several reinforced concrete crosses from the First World War, the same as in the Austrian military cemetery in Rohatyn. These crosses are placed in rows between other burials.

Fig. 6. The cross is decorated in the technique of deep relief. The motive of the crucifixion with the standing nearby

Fig. 7. The cross is decorated in the technique of deep relief. Motif of the figure of the Virgin

Limestone monuments were built for a short time after the Second World War. They were probably made by local folk masters. These are modest crosses, sometimes with a crucifix. Angels were often depicted here. By the 1970s, the manufacture of tombstones had completely shifted to reinforced concrete and lastriko. And at this time, a new fashion began to appear – the manufacture of a monument of black gabbro stone with carved, dotted portraits of buried people. Such monuments are often double and are vertical slabs with patterns. The composition includes a cross. It can be of different shapes and sizes and can be made of various materials, not only of stone but for example of metal.

From the second half of the twentieth century, the lower terrace of the cemetery was filled and the territory of the cemetery was thickened. New burials densely fill the newest northwestern part of the cemetery and at the same time appear throughout the cemetery wedged between the older burials. The tradition of erecting black gabbro monuments with a painted portrait continues to this day. In recent years, there has been an opportunity and a trend to make monuments of natural stone of different bright expressive colours. For example from granite. Different shades of red, green, and brown were added to the traditional colours of black and white. In the historic cemetery in Rohatyn, we can see several new monuments in contrasting colours. These monuments are unusual, we can say unexpectedly very modern in shape. Everyone is different.

As for the physical condition of the tombstones, we can find various materials in the cemetery. 90 % of the monuments are made of stone. These are natural stones such as limestone, sandstone, gabbro, granite and artificial stone such as concrete, reinforced concrete, lastrico. There are monuments made of metal – different metals and in different techniques. There are also several wooden crosses. However, these are temporary crosses on the place of which stone monuments will be erected. This is in line with local tradition, where a wooden cross is placed on a fresh grave, and a stone monument is built no sooner than a year after burial.

The oldest crosses are made of limestone. Limestone is a material that is relatively soft and easy to process due to its physical and mechanical properties. Limestone in the tombstones of the cemetery in Rohatyn was strongly influenced by all existing factors of destruction – the condition of the stone was influenced by structural and textural features, atmospheric and biological factors. There is a lot of biology – a variety of mosses, lichens, ivy that winds on the stone. This condition of the stone makes it difficult to read the inscription on the crosses. It also leads to the scattering of the surface layer of the stone together with the inscription – it is not safe and recoverable. Drawing monuments is a big problem. The thin relief is painted with paint, whether it is lime or oil or other paint, it simply destroys it – it is impossible to see the details, letters, facial features, fingers, etc. Besides, the consequence of such painting is the same as in the case of a biological threat – the shedding of the surface layer of the stone together with the relief. And when that happens, it is not recoverable. We also see physical damage and loss of stone. These are crosses that have fallen or broken into pieces. We can see the folded fragments of crosses, and sometimes we can see a cross that stands, but which lacks, for example, parts of the shoulder, and so on (Fig. 8, 9).

The sandstone found in several monuments is a dark red sandstone known as Terebovlya sandstone, which is still being developed in the vicinity of Terebovlia and Buchach. The most common type of destruction of such monuments is the stratification of the rock due to the structural and textural features of the stone and biological plaques of various types. Sandstone is a stone harder than limestone in this case, biological damage occurs, but they are minimal. As for the stratification of the breed, unfortunately, the first signs of such a phenomenon were already visible.

Reinforced concrete has been used in the cemetery in Rohatyn since the beginning of the 20th century. Unfortunately, we can see individual crosses that fall apart into particles and from the body of which protrude metal fittings. Concrete curbs around graves are in a different condition; it probably depends on the quality of the concrete. No special damage is observed. Military reinforced concrete crosses from the First World War are in good condition. In general, the condition of the material can be described as satisfactory.

Lastrico is a material used in the cemetery since the middle of the twentieth century. Monuments made of this material are in relatively good condition. The downside is that this material is also sensitive to biological damage. Visually, it looks like a greyish and greenish plaque appears on the stone, spots that contribute to the destruction of the stone. But this process is slow and long, so given the average age of such monuments, their condition can be assessed as good.

Gabro also showed himself on the good side. AS for now, there is no damage or loss to monuments made of this material. This may be due to the relatively young age of these monuments. The newest granite monuments are less than ten years old and are in excellent technical condition.

Fig. 8. An example of biological damage to a limestone sculpture

Fig. 9. An example of damage caused by unprofessional painting of limestone

There are not many metal tombstones in the cemetery in Rohatyn. They are also different – made of different metals and in different techniques. Cast monuments are majestic, exquisite works of art. Unfortunately in very poor condition. They are deformed and broken into pieces. Besides, the metal is destroyed extremely by rust. I would say that these monuments are in a threatening condition. There are several interesting metal crosses in the oldest part of the cemetery. Two of the below are also made in the technique of casting. They are quite modest, have not many decorative ornaments and are examples of serial Lithuanian products of their time. This does not mean that they are not valuable. Now such crosses are no longer produced, and there is a small number of them in the preserved historical cemeteries. The metal of these tombstones is also affected by rust and is in poor condition. In the same oldest part of the cemetery, we can see several metal crosses installed in the early twentieth century. They are made of metal strips and have a very interesting pattern. The technique is the same, but the pattern is different for each cross. The whole metal is covered with rust. Stone pedestals are in poor condition and monuments, in general, are also in poor condition

After examining the current condition of the cemetery, it became clear that the cemetery, as well as individual monuments of this cemetery, need to be restored. There is an interesting fact – the cemetery is located on the territory where the church is located, which is included in the UNESCO World Heritage List. This list does not include the church itself, but certain property, as mentioned above. Part of this property is the area where the cemetery is located, but the cemetery is not a monument. It is only part of the surroundings of the monument. But even in this status, care must be taken to preserve the historical and artistic value of the cemetery. The territory of both the cemetery and the church is surrounded by a fence. On the side of Drahomanova Street, the fence is wooden, made of horizontal boards, covered with a wooden roof. On the side of Staromlynska Street, the fence is made of reinforced concrete blocks, and on the side of the river – a metal mesh. Reinforced concrete blocks are light grey, delicate, curly top decorated with openwork balustrade. Each of these parts of the fence is in poor condition – sloping, broken, and in some places completely absent, and therefore requires repair. It would be ideal if it was the same on all sides and made of wood as a material that corresponds to the historical authenticity. The cemetery as a whole is one of several communal cemeteries in Rohatyn. The cemetery is closed for new burials, but the so-called burials to the graves of relatives are held here. In this way, fresh burials appear in the cemetery between old ones. Through the territory of the cemetery, the residents of Rohatyn have laid a path – a kind of communication abbreviation, which runs throughout UNESCO, that crosses the cemetery and surrounds the church. This situation certainly makes it difficult to take care of the territory of both the cemetery and the church.

The territory of the cemetery itself can be called neglected. The grass is not mown, the trees grow randomly, that is, they are not pruned, nobody is watching them, obviously many of the trees are self-seeding. There are no paved paths in the cemetery – only paths trodden in the grass. Recently, the church has been actively fighting against artificial flowers in the cemetery – asking not to bring artificial wreaths, vases, bouquets, etc. This certainly works – the garbage in the cemetery has become much less, but this bad habit has not yet been completely eradicated.

The first challenge is to tidy up the territory of the cemetery, and the next respectively is the conservation of individual monuments. This should be done by specialists. As for stone monuments, they should, first of all, be stabilized statically – to raise, level, strengthen accordingly, that is to do everything necessary that the monument stood steady and strong. Next, you should clean, as needed, strengthen the stone material itself, glue and fasten the broken parts of the monuments. Accordingly, if necessary, the addition of lost parts, the expression of inscriptions, refinement of colour unification. As for metal monuments, the most obvious is the need to combat rust, there is also a need for static stabilization of objects, healing, and if necessary, the reconstruction of some lost elements. The choice of technology and the conservation itself should be done by specialists. Issues such as the addition of lost elements are always debatable and they are decided by experts at restoration councils. And the last challenge when the cemetery is already restored is the need to maintain your facility in such a restored condition. There is a need for constant care, sweeping, cleaning (such as clearing snow in winter, fallen leaves in autumn, mowing the grass in summer), continuous monitoring of the condition of monuments and immediate elimination or correction of minor damage. Such seemingly simple steps can significantly extend the life of cemetery monuments, and hence the cemetery at all.

Conclusions

Rohatyn is an ancient and historic town. Nowadays, Rohatyn is known for the name of Roxolana, and the monument included in the UNESCO World Heritage Site list – it is the wooden Church of the Descent of the Holy Spirit. Despite the lack of legal status of the monument and the presence of modern burials, the historic cemetery near the Church of the Descent of the Holy Spirit is in a satisfactory condition and has retained its historical and artistic value. This cemetery is in a difficult situation – it must be both a monument and a useful object for people. And this is always very challenging.

As for the material of tombstones, it differs greatly. There are also metal and single wooden monuments and a whole palette of stone material. This is primarily local limestone and imported sandstone, gabbro, granite. We are also dealing with the widespread use of artificial stone based on cement. As for the destruction and damage, the situation is not easy. All natural factors of the destruction of geological and biological, chemical character work and do not disappear anywhere. Another human factor is added to the existing cemetery. Non-professional repair or arrangement of monuments such as glueing, painting or clearing, etc. There are many cases when such actions lead to catastrophic consequences. Inaction can be no less harmful. Both the individual monument and the cemetery as a whole require constant care to be in good condition at all times.

The historic cemetery near the Church of the Descent of the Holy Spirit in Rohatyn requires the definition and approval of its legal status and the adoption of a concept for its further functioning and use. Challenges to the ways and methods of preservation must be addressed by specialists, taking into account the special monumental status, and therefore in addition to Ukrainian and international law.

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СУЧАСНИЙ СТАН ТА ПИТАННЯ РЕСТАВРАЦІЇ ЦВИНТАРЯ БІЛЯ ЦЕРКВИ СВ. ДУХА В РОГАТИНІ

Анотація. *Рогатин є містечком давнім та історичним. Воно є відомим і знаменитим своїми історичними, культурними й архітектурними пам’ятками. Історичні цвинтарі, як і церкви є невід’ємною складовою частиною культурного пейзажу кожного міста і містечка. Для українців сам храм є надзвичайно важливим – це унаочнення, матеріальне втілення духовної сутності християнства. У давнину християн ховали довкола церков, а також в церковних криптах. На жаль історичні цвинтарі є дуже вразливими до руйнувань – це фізичні, хімічні і біологічні чинники, а також людський фактор, як то звичайний вандалізм або звичайна некомпетентність при виконанні ремонтних чи опоряджувальних робіт. Для того, щоб успішно створити і втілити програму збереження історичних кладовищ необхідно ретельно їх дослідити задокументувати, інвентаризувати, а також ретельно вивчити матеріал з якого виконані ці пам’ятки.*

Дослідження має за мету вивчити існуючий стан історичного цвинтаря біля церкви Св. Духа в Рогатині. Дослідити матеріал, зокрема кам’яний, меморіальної пластики цвинтаря, проаналізувати причини його знищення і пошкоджень. Показати виклики та завдання, які пов’язані з реставрацією і збереженням цього об’єкту.

Сьогодні Рогатин роблять відомим: ім’я Роксолани і пам’ятка включена у список світової спадщини ЮНЕСКО – дерев’яна Церква Зішестя Святого Духа. Історичний цвинтар біля церкви Зішестя Святого Духа перебуває в задовільному стані і зберіг свою історичну й мистецьку цінність.

Щодо матеріалу надгробних пам'ятників, то він, зокрема, є дуже різний. А що стосується руйнувань і пошкоджень, то всі природні чинники руйнування – працюють. На діючому цвинтарі додається ще людський фактор – наприклад, нефаховий ремонт чи впорядкування пам'ятників. Дуже шкідливою є й бездіяльність. Як кожен окремий пам'ятник, так і цвинтар вцілому, для того, щоб постійно перебувати в доброму стані, вимагають постійного догляду.

Історичний цвинтар біля церкви Зішестя Святого Духа в Рогатині вимагає визначення і затвердження свого правового статусу і прийняття концепції щодо його подальшого функціонування і використання. Виклики щодо способу й методики збереження, мусять вирішуватися фахівцями з урахуванням особливого пам'яткового статусу, а значить, крім українського, ще й міжнародного законодавства.

Ключові слова: *історичний цвинтар, меморіальна пластика, камінь, збереження, реставрація, архітектура.*

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SOCIAL SCENARIO AND FORMATION OF THE CONCEPT OF A MULTI-APARTMENT RESIDENTIAL COMPLEX

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Abstract. The article describes the features of the scenario approach for creating the concept of multi-apartment urban housing, in particular, residential complexes; shows the expediency of its application for such tasks; defines the social scenario of a residential complex; gives examples of possible socio-demographic scenarios that can form the basis of a general urban planning, spatial and planning concept and be a motivated basis for drawing up a task for designing multi-apartment residential complexes.

Key words: multi-apartment residential complex, socio-demographic scenario, linguistic, socially effective, architectural and spatial model

Problem statement

Nowadays, approaches to designing multi-apartment housing in large cities of Ukraine should change. This is evidenced by the existence of many problems that arise in this segment of residential real estate. In our opinion, this is a conflict between price and quality, a discrepancy between the housing environment and the expectations of residents-consumers. Also, these problems arise due to significant miscalculations of developers who focus on the so-called actual demand of various segments of the population for urban housing. In our opinion, some of these problems could be solved if we involve a scenario approach at the stage preceding the development of the design task in the process of creating multi-apartment formations of various capacities and densities.

Scenario approach allows "...to clarify or comprehend actions currently taken in the light of future events; allows you to study a diverse and uncertain future; provides for a systematic approach; allows you to take into account qualitative data and strategies of all interested parties; reminds that information and predictions are never neutral and always reflect someone's interests; supports the use of various methods; calls into question biased predictions and forecasts..." (Pereverza, 2011).

In the scenario approach usually, a combination of qualitative and quantitative approaches is effective, such as: taking into account the opinions of specialists (of research) and experts in various areas of knowledge related to architectural design in sociology, demography and psychology, as well as economics and urbanism; using methods of collective discussion and brainstorming of specialists-architects, sociologists, urbanists, economists, etc.; conducting up-to-date monitoring and analysis of indicators and parameters of the studied socio-spatial structures, which are multi-apartment residential complexes and their users.

The scenario approach can be implemented during the creation of socio-demographic models of future housing education, and accordingly influence its conceptual urban planning, spatial and functional planning solutions.

Status of the problem research

Identification of problems that arise in Ukraine today and ways to solve them; analysis of the current state and latest trends in housing construction in Ukraine and the world (European experience), design methods covered in the works of I. P. Gnes (Gnes, 2013), H. D. Yablonska (Yablonska, 2009), (Yablonska, 2013), (Yablonska, 2016), (Yablonska, 2018), V. I. Knysh (Knysh, Yablonska, 2017), (Knysh, Yablonska, 2018). Fundamental analytical work on modern urban housing is presented in a series of books published by a+t authors Aurora Fernández Per, Javier Mozas (Aurora Fernández Per, Javier Mozas., 2016). K. V. Kiyanenko's fundamental research is devoted to the issues of social modelling of housing.

(Kiyanenko, 2015). The scenario method of forming apartment buildings is proposed by S. H. Buravchenko (Buravchenko, 2020). A purely sociological approach to assessing the quality of the residential environment by residents is comprehensively presented in the collective monograph of E. Libanova, O. Osaulenko, L. Cherenko (Libanova, Osaulenko, Cherenko, 2020). But the issues of creating socio-demographic scenarios of local communities of residents, as a motivated basis for determining the direction of urban planning and spatial conceptual solutions of multi-apartment formations, in particular, residential complexes, require updating and research.

Purpose of the article

The article defines the relevance and significance of socio-architectural aspects in the design of multi-apartment housing, points out the close relationship between the socio-demographic characteristics of a local-territorial community and architectural and urban planning solutions of multi-apartment residential complexes, and provides several examples of possible social scenarios that can become the basis for an architectural and spatial model of a residential complex.

Research and discussion

When designing multi-apartment residential complexes, for their effective use over a long time, it is possible to apply a scenario approach, which consists in formulating possible stories of the development of states-events in the life and actions of people living in it, in the rapidly changing conditions of a modern city. The purpose of this approach is to form certain socially effective and architectural-spatial models of a residential object that would correspond to the diverse demographic, socio-economic, mental and other conditions of potential groups of residents of such complexes.

Despite the absolute diversity of modern urban residents, when forming the task and further designing multi-apartment residential complexes usually either a normative-unified or development-marketing approach is used. This leads to various problems in the further convenient and efficient use of housing by consumers.

Events that do not fit into the standard course of things cannot be predicted based on previous trends. The reason for this is the rapid changes in the social, economic and technological spheres, which had no precedents in the experience of a more or less comfortable use of living space. Transferring previous design experience to the future does not always give a positive result. It can lead, on the one hand, to the dissatisfaction of residents-users with housing that does not meet expectations, and, on the other, to miscalculations of investors and developers who rely on changing trends in the real estate market.

These models are based on a social scenario, which can be defined as a set of socio-demographic states of a local group and a sequence of possible events in people's lives that occur in time and space of a residential complex. Socio-demographic conditions of potential users determine their main preferences for the residential environment. Possible events change their life needs and requirements for housing, and accordingly, the processes of life management, as well as the most convenient (comfortable) use of various spaces in multi-apartment residential complexes.

The scenario that is created has a hypothetical nature, includes a description of alternative variants of the future, as chains of states and events that have a causal relationship, internal consistency, reliability and explanatory-probabilistic nature.

The social scenario can serve as a basis for creating project concepts of urban housing, in particular, such self-sufficient integral objects as residential complexes. This approach, at the stage of creating a concept, allows you to model situations of the interaction of an individual, family or group of residents with the living environment (space), including in a residential complex, as a local territorial – autonomous integral housing entity, which consists of residential premises and apartments grouped around vertical and horizontal internal communications, elements of house and urban infrastructure, house territories (yards) with landscaping, as well as open and closed parking lots, entrances and approaches, etc.

The scenario of life in an apartment complex is a locally generalized model of the life of a group of people (community) in a certain territory. This scenario can be "written", that is, it is presented in the form of a linguistic, hypothetical model that reflects several community-specific processes. It can provide answers to some questions, namely: what kind of people (age, marital status, status, mentality, wealth) and how they live (lifestyle, preferences); what they want to get from using certain elements of the housing environment; what priorities they set for themselves when choosing and using the housing environment. In other words, this model takes into account the social, demographic, property and status aspects of a person's life, that happens and changes over a certain period. The model assumes diversity both in terms of socio-demographic, property and status of people belonging to this community, as a condition for the viability of such an entity – "multi-apartment residential complex".

The scenario is formed based on socio-demographic characteristics of the main and specific social groups of the urban population.

In the past, when designing mass multi-apartment housing, only the type of family was taken into account by the number of its members, with very strict rationing of the area. And later, in fact, only its property status was taken into account, that is, the financial capabilities of the person (family). Previous experience, which was largely negative, both in the conditions of an extremely regulated planned socialist and poorly regulated market economy, showed that the creation of a comfortable housing environment should include a list of such characteristics as age status, social status, property status, as well as lifestyle, the mentality of future users. Also, today it is impossible to neglect the time factor when designing housing, that is, how long a potential consumer plans to use it – constantly, for a long time or for a short time.

Each of the above features has many states that form a complex mosaic that characterizes both the potential consumer and his needs for housing, its quality and with open – or closed-house infrastructure, etc. This should affect the functional-planning (function and structure) and three-dimensional-spatial (number of storeys, morphology, location) methods of organizing multi-apartment residential complexes. Moreover, these features should be taken into account at all levels of the "housing" system – residential development, residential building (complex), residential unit (apartment), etc.

All this socio-demographic heterogeneity of the urban population should be adequately manifested in the variety of use of territorial-urban planning and architectural-typological techniques in the design of residential complexes. There are currently a lot of these techniques. Their use in real design will be able to ensure maximum compliance with the needs and capabilities of the local-territorial community of such complexes. This will also allow you to diversify their architectural, planning and three-dimensional solutions.

There can be many variants of social scenarios and corresponding urban planning and architectural concepts of multi-apartment residential complexes.

For example, a residential complex is calculated by family type – for singles (50 %) and simple families with one or two young children (50 %); by age-mainly for young and below-average age; by social status – mainly for working and studying (students); by property status – for the poor; by living time – a small part of housing users intend to live permanently (20 %), the other (the majority) – for a long time (working singles, young couples without children) – 70 %, the third part – for a short time (working people, students) – 10 %. Such a limited and diverse composition of residents assumes that the comfort level of this complex will be the minimum allowable, and the density will be quite high (600–700 people/ha). That is, living conditions, planning solutions, areas of residential premises, house infrastructure and arrangement of the house territory should

provide, on the one hand, acceptable living conditions (normative and permissible), and on the other, correspond to their property status and lifestyle.

In general, the lifestyle of such a community is quite dynamic and open; the requirements for the arrangement and layout of residential units do not provide for large full-fledged apartments of the "family nest" type. It can be small-room apartments, studio apartments, or smart apartments. The location of residential units in this complex can be differentiated. Vertically: on the lower floors – apartments for families with children, on the upper floors – studio apartments for working singles and students. Horizontally: isolated blocks-houses united by one territory and adjacent infrastructure. The presence of a separate courtyard in such a complex is also not a priority. This can be an open area attached to the house with places for short-term recreation and public sports, with a small play space for young children.

Such a socio-demographic version of the user community provides for the organization of the corresponding infrastructure of the residential complex. For example, the availability of places for storing bicycles and strollers; auxiliary common areas for storing things and sports equipment, etc; small common areas for sports (with exercise equipment); a mini kindergarten or a space for children where you can leave them for a while under supervision; household premises (self-service laundry), etc. You also need parking space (underground, above-ground, open type) at a rate of 50 % of the number of residential units. It is relevant to have small office space in such a complex, where you can rent a place and time for work or study. It is possible to provide a room for a small cafe, fast food, an order table, a mini-store, etc. The main condition is that the infrastructure elements meet the complex needs, lifestyle and financial capabilities of residents.

Such a linguistic model of the socio-demographic scenario can have several conceptual architectural, spatial and typological options for housing education solutions. For example, this complex can be solved as several separate residential buildings-plates of variable storeys, with a mixed sectional-corridor or corridor-gallery structure, partially united by a stylobate, where both infrastructure and parking spaces for residents can be located.

A different socio-demographic scenario is possible for a multi-apartment residential complex. The local-territorial group of potential consumers includes, by family type of different ages – simple (nuclear, 1–2 children) – 60 %, as well as complex families (adult with children and elderly parents) – 40 %. The family may include those who study and work, housewives, pensioners, according to their property status – average income, who need comfortable housing for permanent residence.

Such a local community usually tends towards a secluded lifestyle focused on family, raising children, and so on. The family way of life, average income and intention of permanent residence imply increased requirements for the quality and comfort of private residential and intra – and adjacent-space of general use. These requirements should refer to the residential units (apartments) themselves, to their area and zoning; to the presence of isolated kitchens, bedrooms, summer, plumbing and utility rooms; to the quality of microclimate, natural ventilation, orientation, noise protection, etc. Also, in general, such a community's priorities when choosing housing will be focused on less amount of apartments per floor and less amount of storeys, as comfort conditions for permanent residence. Such a community usually has increased requirements for the availability of guaranteed security measures for both intra-house and yard space. Priority for them is a courtyard without outside access, with appropriate landscaping and greenery, with clear zoning of playgrounds for the elderly, family recreation, children's areas and outdoor sports spaces. The internal infrastructure of the house may include a mini kindergarten, club spaces for children and the elderly, possibly a small cafe for family holidays, fitness, hair salon, mini market, etc.

The socio-demographic scenario given above can, for example, be conceptually conceived in the form of a blockhouse, medium storeys, sectional structure with 3–4 apartments on the floor of a residential section, different in the number of rooms (bedrooms), with through passages (courtyard-street) for easy use, with the use of security measures (automation or concierge), with the organization of aboveground (stylobate) or underground parking (100 % of the number of residential cells), with the placement of intra-house infrastructure focused on the courtyard of the complex. It is also possible to differentiate the types of apartments by room size, total area and placement in the structure of the house (section). For example, vertically, i.e. multi-room apartments for complex families on the lower floors or two-level multi-room apartments on the upper floors, etc.

For further drawing up a design assignment, you need urban planning and natural and climatic analysis of the site, analysis of transport and pedestrian accessibility, urban infrastructure, etc. Of course, the further design requires a more detailed study of the task, based on the built-up area and location of the site, as well as calculation of both the type, number of apartments and their area, availability and area of premises for house infrastructure, calculation and organization of places for closed and open parking, etc.

But the creation of a socio-demographic scenario and the selection of a conceptual spatial planning solution that will suit it on the principle of "gloves" will make it possible to more fully and sufficiently ensure that the architectural solution of the residential complex meets the needs and capabilities of potential consumers of a certain part of the urban community and, in the end, to avoid major miscalculations of developers, investors and developers that take place today.

Conclusions

Housing, in general, and multi-apartment housing, in particular, is primarily a socially-oriented product. The vast majority of citizens do not build their housing. He chooses it, that is, buys or rents what others have come up with, designed and built. The question of how much this corresponds to their interests, ideas and needs is always open.

Who today determines how much housing will meet the needs and lifestyle of a potential consumer? In theory, it is a potential consumer, but in practice, it is a developer or investor. But, in this process, there is an intermediary who carries out (designs) multi-apartment housing – an architect. Going along with the customer is the easiest way, but not the most effective for all the actors in this process. The investor is interested in a quick result. Monitoring conducted by the customer's representatives is focused on fleeting, often random circumstances and situations in the residential real estate market.

An architect who designs multi-apartment housing should not only be fluent in a variety of urban planning, spatial and functional planning techniques for organizing multi-apartment housing, but also take into account modern research on sociology, urbanism, the psychology of the citizen, understand the needs and capabilities of the urban community and, based on this knowledge, develop a socio-demographic scenario for creating an architectural concept of housing education.

If you are motivated and persistently offer solutions that will be more socially adapted to the interests of the end-user, then gradually the situation as a whole will level out. This is a regular European practice and is already beginning to manifest itself in some residential facilities that are being built or started to be operated in Ukraine: in Kyiv, Lviv, etc.

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СОЦІАЛЬНИЙ СЦЕНАРІЙ І ФОРМУВАННЯ КОНЦЕПЦІЇ КВАРТИРНОГО ЖИТЛОВОГО КОМПЛЕКСУ

Анотація. *На ринку житлової нерухомості в Україні існує низка проблем. Необхідно змінити підходи до проектування багатоквартирного житла. Деякі проблеми можна вирішити, використовуючи сценарій підходу на етапі, що передує створенню проектного завдання.*

Він полягає у формулюванні можливих історій розвитку держав та подій у житті та діях жителів у швидко мінливих умовах сучасного міста. Його метою є формування конкретних подійних та архітектурно-просторових моделей житлового комплексу, які відповідали б різним демографічним, побутовим, соціально-економічним характеристикам потенційних груп мешканців. Ці моделі базуються на соціальному сценарії. Це сукупність соціально-демографічних умов місцевої групи жителів.

Це послідовність можливих подій у житті людей, які вчасно відбуваються в житловому комплексі. Соціально-демографічні характеристики потенційних мешканців визначають основні переваги щодо організації середовища проживання.

У статті представлено кілька варіантів соціальних сценаріїв та відповідні містобудівні та архітектурні концепції багатоквартирних житлових комплексів.

Використання соціального сценарію на етапі створення концепції дозволяє моделювати ситуації взаємодії окремої людини, сім'ї чи групи жителів із середовищем проживання (простором). Створення комфортного середовища проживання повинно включати ряд ознак: вік, соціальний статус, майновий стан, спосіб життя, менталітет мешканців. Також необхідно враховувати час перебування в житловому комплексі – постійний, довгостроковий та короткочасний.

Соціально-демографічна різноманітність характеристик мешканців повинна проявлятися в різноманітних містобудівних та типологічних прийомах. Це допоможе забезпечити максимальну відповідність потребам та можливостям місцево-територіальної громади, яка проживатиме у таких житлових комплексах. Це також урізноманітнить їх архітектурні, планувальні та об'ємно-просторові рішення.

Ключові слова*: багатоквартирний житловий комплекс, соціальний сценарій, подія та архітектурно-просторова модель.*

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FORMING PRINCIPLES OF SPATIAL-PLANNING MODEL FOR RECREATION ENVIRONMENT IN RURAL LOCAL CONDITIONS

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Abstract: the article is devoted to topical issues of scientific elaboration of the model of spatial-planning organization of amalgamated territorial communities and determination of principles of formation of their tourist-recreational environment.

Seven relevant principles have been formulated:

the first principle of conformity of the spatial-territorial organization to the task of realization of the strategic and operational purposes on development of tourist-recreational branch;

the second principle is the interconnectedness of the directions of development of spatial planning of the community, its separate parts or settlements with the functional-planning organization of tourist-recreational activity;

the third is the principle of complex landscape planning of the territory of the amalgamated territorial community;

the fourth principle – the principle of structured differentiation of calculations and construction of service systems in settlements with recreational and tourist orientation;

the fifth principle of formation of the spatial-territorial model is to implement a scenario approach to the organization of planning and visual connections between the main structural elements of the space of the community, settlements, their parts and individual attractive objects;

the sixth is the principle of continuity and organic combination of planning structures of resort and recreational objects and complexes with other structural elements of settlements;

the seventh principle is the principle of spatial accentuation of the leading tourist attractions in the spatial-planning organization of territories of communities and their separate parts and structural elements.

It is concluded that the first three principles (first, second and third) relate to the formation of approaches to the development of techniques for the development of urban planning documentation at the community level, and the last two (sixth and seventh) relate to local documentation at the level of settlements or individual recreational areas . In turn, the fourth and fifth principles are implemented in urban planning documentation at the level of both communities and settlements.

Key words: principles, spatial planning model, recreation of the environment, rural areas with local communities.

Introduction

Formation of new administrative-territorial entities – united territorial communities of attraction for the search with a search for ways to ensure economic viability and gradual and continuous socio-economic development. In these conditions, the definition of principles and the development of communication methods,

the creation of those associated with the creation of a spatial-planned organization of territorial communities, individual settlements of their structural elements in accordance with the needs of recreational and tourist activities in those cases when this activity is important from the standpoint of socio-economic development ...

Study of the issue

The solution of the problems of the optimal and rational architectural and planning organization of agro-recreation territories and settlements is at the junction of their spatial planning and urban planning formation of modern recreational formations.

The problems of the development of rural areas, systemic services for rural settlements and the architecture of rural residential and public buildings were developed in the following works:

Deleur G. A., Khokhol Yu. F., Village architecture. Planning and building. (Deleur G. A., Khokhol Y. F. 1979), Under. total ed. Yu. F. Khokhla. Planning of agricultural and agro-industrial enterprises. (Khokhol Yu. F. ed. 1988.) Panchenko T. F. Topical aspects of the organization of rural tourism (Panchenko T. F. 2000).

New for domestic science and practice concerning the issues of spatial planning of united territorial communities, in particular, related works: Voiko I. I., Kryshtop T. V., Chizhevska L. A. Spatial planning as a tool for rational growth of OTG (Voiko I. I., Kryshtop T. V., Chizhevskaya L. O. 2017), T. V. Kryshtop, Spatial planning as a tool for strengthening the institutional capacity of OTGs in territorial resource management (Krishtop T. V. 2019), Moiseenko Z. V., Kosenko V. N., Kosenko Yu. A. and etc.Village architecture of Ukraine. (Moiseenko Z. V., Kosenko V. N., Kosenko Yu. A. and others. 1987), Yu. A. Kosenko, Yu. V. Samoilovich, A. P. Chizhevsky and etc. To be more beautiful for the village. Councils for the improvement of the village (Kosenko Y. A, Samoilovich Y. V, Chizhevsky A. P. and others. 1990).

The methodological basis of scientific research on the problems of recreation and tourism, issues of regional organization and district planning of recreational areas, architectural and planning organization of urban and rural settlements, resorts and recreation areas, nature protection and historical and cultural heritage are: Panchenko T. F. Tourist environment: nature, architecture, infrastructure (monograph) (Panchenko T. F., 2000) Panchenko T. F. Rural, green tourism is a new type of ecological tourism. Our home is rural, green tourism (Panchenko T. F., 1998.), Risch G., Koshelyuk L., Kryshtop T. Guidelines on spatial planning for the authorized bodies of urban planning and architecture of united territorial communities (Risch G., Koshelyuk L., Kryshtop T., 2019), Yatsenko V. O. Classification of territorial communities as group settlement systems of territorial features of formation and development (Yatsenko V. O., 2017). Yatsenko V. O. The significance of the urban planning system in the socio-economic development of territorial communities, modern problems of architecture and urban planning (Yatsenko V. O., 2018).

Purpose of the article

At the moment, it seems relevant to scientifically correct the models of the spatial-planning organization of public territorial communities and determine the principles of their formation as integral administrative-territorial formations and integrated ecological and urban planning objects with their inherent clear territorial restrictions, internal development and external communications.

Achieving the tasks of stable capacity for new administrative-territorial entities – amalgamated territorial hromadas, for which tourist and recreational activity is a decisive or essential component of socio-economic development, the direction is connected with the definition of principles and formulation of methods for creating a spatial-planning organization of territories of communities, individual settlements and their structural elements in accordance with the needs of recreational and tourism activities as a key component of their socio-economic development.

Within the framework of a coherent administrative-territorial formation – a amalgamated territorial hromada, a conceptual approach should be implemented to form a spatial-planning structure as an integrated ecological-urban development object, characterized by clear territorial constraints, internal development and external links in the spatial planning structure of regions or the country as a whole.

Research methodology requires the classification of amalgamated territorial communities, which differ in quantitative and qualitative characteristics. Individual communities that are part of communities, according to the features of their planning organization and location of attractions, are subject to typology.

"Classification" refers to "quantitative aggregates" (classes) that reflect the stages or dynamics of any urban development, including recreational entities, and their hierarchical order. The "typology" includes the fixation of a set (types) that are consistently different in "qualitative characteristics".

Based on the evidence-based classification features of amalgamated territorial communities from the standpoint of recreational and tourism activities, two groups are distinguished. The first is those in the "Strategies for Socio-Economic Development", of which this type of activity is defined as a strategic goal, that is, a key (city-forming). The second is those amalgamated territorial hromadas for which this direction of development is an operational goal, that is, a tangible but secondary task. Thus we have two classes of amalgamated territorial communities: which we define as "general" and "selective" recreation.

The obtained classification of administrative-territorial entities – amalgamated territorial hromadas, taking into account the analysis of the specifics of settlements and their individual structural elements of agro-recreational orientation became the basis for determining the principles of formation of spatial-territorial model of recreational environment in rural areas (Fig. 1).

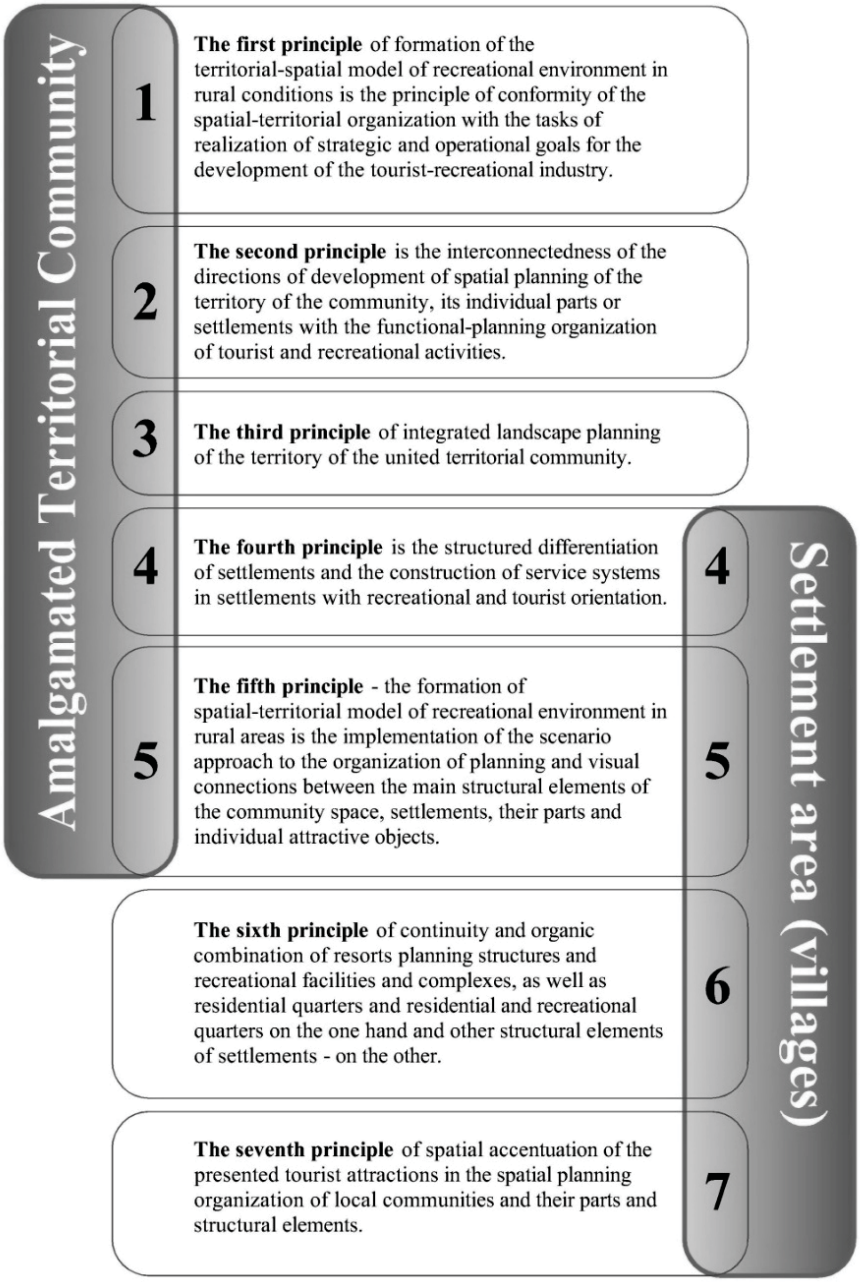

Fig. 1. Formation Principles of spatial-planning recreational environment model in rural areas

Successful implementation of the provisions of the Strategies of socio-economic development in the short and long term involves finding and finding the most suitable for solving strategic or operational goals of the spatial planning system of the amalgamated territorial hromada and its individual components, settlements, landscapes and their parts.

This is the first formation principle of the recreational environment territorial-spatial model in rural areas – the principle of compliance of the spatial-territorial organization with the task of implementing strategic and operational goals for the development of tourism and recreation.

Practical approbation of this principle was carried out in the development process of the project "Territory planning scheme of Verkhovyna district in Ivano-Frankivsk region", and also with direct participation of the author – projects: "Territory planning scheme of the amalgamated Volochysk settlement hromada in Khmelnytsky region", in particular – sections related to the development of tourist and recreational activities.

The second principle is the interconnection of the directions development of the hromada spatial planning, its individual parts or settlements with the functional-planning organization of tourist and recreational activities. This principle also provides for the development and application of planning techniques that ensure the implementation of tourist and recreational activities in the hromada, settlements and their parts.

Quite clearly this principle implementation of formation spatial planning recreational environment model is demonstrated by project solutions related to the organization of tourist and recreational activities in Satanivka amalgamated territorial hromada and Koblevska amalgamated territorial hromada, which should be classified as "general" communities recreation.

For example, in the first the appropriate place and role of the territories at Sataniv resort, the sanatoriums territories, the Tovtry reserve territory, the settlements territories, which have their own role in the implementation of tourist and recreational activities, such as the village Zaychyky and Ivanivtsi. All these areas are planned to be connected by roads, streets and footpaths. All these areas, sites and territories, combined with the nature of landscaping and arrangement are components of the actual functional-planning organization of the Satanivska hromada recreational and tourist activities, for which this area of economic activity is by implementing a strategic goal in its socio-economic development.

Accordingly, the content of design decisions on the tourist and recreational industry organization of Volochyska territorial hromada in Khmelnytsky region and Zavodska territorial hromada in Ternopil region, which are classified as communities of "selective" recreation, reflects the nature of another spatial planning model.

Recreational and tourist activities are allocated only a part of the territory that has existing or designed sanatoriums, specialized functional purpose areas, the relevant pedestrian and transport directions and connections.

Maximum key resource use of the rural community – the territory is to carry out a comprehensive assessment of landscapes for tourism and recreation suitability and take into account the results of such assessment in the spatial planning of the amalgamated territorial hromada territory. This is the third principle – integrated landscaping of the united territorial community.

The experimental design carried out with the participation of the author on the territorial planning development projects for the united territorial communities from different regions of Ukraine showed the urgent need to develop a separate section of landscape planning. This work is carried out on the basis of assessing the landscape features of the community from the standpoint of ecological and urban characteristics set. The proposed and developed method of landscape planning is aimed at implementing the principle of integrated landscape planning of the rural community. One of the key results is to determine the maximum load – the possible one-time number of vacationers, tourists or vacationers. This is of great practical importance for the socio-economic development of the community, the relevant strategic and operational objectives implementation, as well as full compliance with environmental and environmental requirements.

The research and analysis of project practice related to the development of community planning projects and master plans of their individual settlements, demonstrate the legitimacy of the fourth principle – the principle of structured differentiation of calculations and construction of service systems in settlements with recreational and tourist orientation. This principle consists in segmentation of service systems according to the organization of recreational and tourist activity, and also provides carrying out calculations of capacity and capacity of objects of service taking into account a combination of needs of the local population and separate groups of vacationers or tourists depending on a type and character of the formed recreational and tourist destination.

Segmentation of service systems involves taking into account as a calculated value of the local population and vacationers together or separately based on the results of the analysis. The key is to adhere the basic principles related to ensuring the conditions of sustainable development for all settlements without exception. First of all, it is an opportunity to gradually increase the level of engineering improvement of individual parts and settlements as a whole. Next – ensuring the full functioning and development of the infrastructure of mandatory services at the level of regulatory requirements.

First and foremost, it is an opportunity to receive primary health care from vacationers at local health facilities. In this case it is necessary to consider the possibility of peak loads of the recreational and tourist industry of the community as a whole or in terms of individual settlements.

Research shows that vacationers should not be taken into account when calculating the need for places in preschool and school facilities. There is also no need to increase the number of seats in existing cultural institutions, a more urgent task is their more active and intensive use, including serving vacationers.

All other services, namely: catering, trade and rental, household and banking services, communication and the Internet are provided by local entrepreneurs and commercial structures on a market basis. They make up their share of the overall socio-economic development of the community in terms of small and medium business development.

The fifth principle of forming a spatial-territorial model of the recreational environment in rural areas is to implement a scenario approach to the organization of planning and visual connections between the main structural elements of the community, settlements, their parts and some attractive objects.

The scenario approach for the arrangement of existing and creation new planning connections should be the basis for the formation for all routes of tourists and vacationers. It solves a number of tasks that provide a lasting impression of hospitality and comfortable orientation in space for each guest, as well as promotes full acquaintance with tourist attractions and other local attractions, in particular, during the implementation of hiking and other walking routes.

The formation of the spatial-territorial model of the recreational environment in rural areas is based on a general and thorough analysis and generalizations of all structural elements from the community as a whole, to individual parts of settlements or recreational and tourist formations.

That is why the first three principles of forming a spatial planning model of the recreational environment apply to the community as a whole, both for communities of “general” and for communities of “selective” recreation, the fourth and fifth principles equally apply to the community and individual settlements, and the following two principles – the planning organization of settlements and their separate parts or tourist and recreational formations.

The sixth principle of continuity and organic combination of planning structures of resort and recreational facilities and complexes, as well as residential quarters and residential and recreational quarters on the one hand and other structural elements of settlements should be applied to form the functional-planning structure of resort and recreational settlements and settlements – on the other. This principle should also be the basis for the formation of the functional-planning structure of agro-recreational villages, on the territory of which or directly next to which there are outstanding attractive objects. That is, this principle is universal for the formation of functional and planning structures of settlements of all types located in communities whose socio-economic development is determined by tourist and recreational activities.

The analysis of foreign and domestic experience shows that the creation of a full-fledged recreational and tourist environment will be faster and more complete, the more measures will be implemented to form an aesthetically expressive space of the community and its individual settlements.

The following principle of formation of the spatial-territorial model of the recreational environment in the conditions of a countryside is directed on the decision of the problems connected with it. This is the seventh principle of spatial emphasis of the leading tourist attractions in the spatial planning organization of communities and their individual parts and structural elements. Its content is to form planning and visual connections of separate planning structural elements and functional zones of united territorial communities, settlements, their separate parts with the leading tourist attraction or recreational object. The most important and appropriate is the use of a set of design and planning and other measures for agro-recreational settlements, in the construction of which there are outstanding or significant tourist attractions. This primarily applies to those settlements in the planning structure of which are monuments of architecture, history and culture, which usually exist in combination with natural attractions.

The study shows that the developed and presented principles of formation of the spatial-planning model of the recreational environment in rural areas are exhaustive and are quite sufficient to solve the tasks in all possible urban situations.

General conclusions

The study shows that the principles of the formation of a spatial-planning model of a recreational environment in rural areas have been processed and presented; they are exhaustive and are quite sufficient for solving the tasks in all possible situations. Next, you should develop and formulate the appropriate planning and compositional techniques.

The first three principles (first, second and third) relate to the formation of approaches to the development of methods for the development of urban planning documentation at the level of community territories, and the last two (sixth and seventh) relate to local documentation at the level of settlements or individual recreational areas. In turn, the fourth and fifth principles are implemented in urban planning documentation both at the level of community territories and settlement territories.

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ПРИНЦИПИ ФОРМУВАННЯ ПРОСТОРОВО-ПЛАНУВАЛЬНОЇ МОДЕЛІ РЕКРЕАЦІЙНОГО СЕРЕДОВИЩА В УМОВАХ СІЛЬСЬКОЇ МІСЦЕВОСТІ

Анотація: *Стаття присвячена актуальним питанням наукового опрацювання моделі просторово-планувальної організації об'єднаних територіальних громад та визначення принципів формування їх туристично-рекреаційного середовища.*

Сформульовано сім відповідних принципів:

<u>перший принцип</u> відповідності просторово-територіальної організації завданням реалізації стратегічної та оперативної цілей з розвитку туристично-рекреаційної галузі;

<u>другий принцип</u> полягає у взаємопов'язаності напрямків розвитку просторового планування території громади, її окремих частин чи поселень з функціонально-планувальною організацією туристично-рекреаційної діяльності;

<u>третій</u> – це принцип комплексного ландшафтного планування території об'єднаної територіальної громади;

<u>четвертий принцип</u> – принцип структурованої диференціації здійснення розрахунків та побудови систем обслуговування в населених пунктах з рекреаційно-туристичною направленістю;

<u>п'ятий принцип</u> формування просторово-територіальної моделі полягає в реалізації сценарного підходу до організації планувальних та візуальних зав'язків між основними структурними елементами простору території громади, поселень, їх частин та окремих атрактивних об'єктів;

<u>шостий</u> – це принцип неперервності та органічного поєднання планувальних структур курортно-рекреаційних об'єктів та комплексів з іншими структурними елементами населених пунктів;

<u>сьомий принцип</u> – це принцип просторового акцентування провідних туристичних атракцій в просторово-планувальній організації територій громад та їх окремих частин і структурних елементів.

Складається висновок про те, що перші три принципи (перший, другий і третій) стосуються формування підходів до відпрацювання прийомів розробки містобудівної документації на рівні територій громад, а останні два (шостий та сьомий) мають відношення до місцевої документації на рівні поселень або окремих рекреаційних територій. Так само четвертий і п'ятий принципи реалізуються в містобудівній документації як на рівні територій громад, так і територій поселень.

Ключові слова: *принципи формування, просторово-планувальна модель, рекреаційне середовище, сільські об'єднані територіальні громади.*

Relevant requirements for the articles submitting to the scientific journal «Architectural Studies» of Lviv Polytechnic National University

The scientific articles that have not been published before can be accepted for publication in a scientific edition. They must be dedicated to the following subjects:

1. «The theory and history of architecture»;
2. «Architecture of buildings and edifices»;
3. «Architectural environment design»;
4. «Urban planning, district planning, landscape»;
5. «Restoration of architectural and artistic heritage»;
6. «Design»;

The bulk of the article script: 6–10 pages of the A4 (the quantity of symbols in the whole article 15–25 thousand, spaces included).

The article language: English.

General requirements for the presentation of the article script:

- Sheet format A4 (210×297 мм). Page margins: left – 1.8 cm, right – 2.5 cm, from above – 2 cm, from below – 2.7 cm. Page margins mirrored.
- Running titles: header – 1.25 cm, footer – 1.6 cm.
- Paragraph indent – 1.0 cm.
- Type – Times New Roman Cyr, text size – 11 pt, interval – 1.15.
- The text is aligned relative to the page width.
- The page numbers are not put.
- The inside textual references and bibliography are presented according to Harvard system, submitted in a source language accompanied by Latin transliteration.
- The articles are presented in the format of *.doc.
- The name of the file should include the number of publication subject and the surname of the first author in Latin (e.g. 6_Avramenko.doc – is submitted on the topic «design»).

The article structure:

- Information about the authors
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